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Book of Abstracts

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Editors
N. Daghir, H. Khouri and G. Sayegh

Hosted by the Lebanese Branch of the
World's Poultry Science Association

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Welcome To Lebanon

On behalf of the Lebanon Branch of the WPSA, I would like to extend to all of you our heartiest welcome to Lebanon, Land of the Cedars and origin of the written word. Lebanon is rich with historical sites and blessed with natural beauty and fair weather all year round. You will be in Beirut at a time when you can enjoy the many beaches as well as the cool mountain areas which are only an hour's drive from the conference venue, the American University of Beirut (AUB). The University is the oldest in the Near East region, established in 1866, with one of the most beautiful campuses in the World. It is located on the Eastern tip of Beirut on the shores of the Mediterranean Sea. The campus covers 65 acres of gardens, 19th century buildings and wooded areas. The area around the campus is rich with shopping boutiques, restaurants for all tastes, and a variety of hotels. All these are within walking distance of the conference venue.

The scientific sessions of the conference will take place in West Hall, one of the oldest buildings on campus. The program consists of three parts, the first being the 15 invited papers, followed by thirty short oral presentations and 50 poster presentations. All these address a wide variety of timely topics with emphasis on the problems and challenges of the poultry industry in the Mediterranean region.

We want to thank all the speakers and poster presenters who are joining us from 31 countries and from all five continents. We also want to thank the reviewers of over 100 abstracts received by the scientific committee, the members of the organizing committee as well as members of the scientific committee for their many hours and days of work to make this meeting a success.

We hope that you will enjoy the various scientific sessions as well as the social activities and tours that you choose to take after the conference.

Our sincere thanks to all participants and to all exhibitors. Special thanks should go to all our sponsors for without their support, this conference would not have been possible.

We wish you all a very successful meeting and an enjoyable time in Lebanon.

Nuhad Daghir, President

WPSA- Lebanon Branch

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The Organizing Committee of the 4TH Mediterranean Poultry Summit 2014 in Beirut wishes to thank the sponsors of the Conference for their generous support.

Oral Sessions (Program Outlook)

Wednesday Sept. 03, 2014	
9:00a-10:00a	Plenary Session I Economic Status of Poultry Industry in the Med. Region; Chair: Dr. D. Flock
10:30a-11:00	Plenary Session II **Environment and genetic Interactions;** Chair: Dr. N. Daghir
11:30a-12:00p	Oral Session II **Environment and genetic Interactions;** Chair: Dr. N. Daghir
12:00p-13:00p	Plenary Session III **Alternative Feed Sources for the Med. Region;** Chair: Dr. M. Farran
02:00p-03:00p	Oral Session III **Alternative Feed Sources for the Med. Region;** Chair: Dr. M. Sifri
03:00p-03:30p	Plenary Session IV **Alternative Feed Additives for Gut Health;** Chair: Dr. M. Hafez
04:00p-05:30p	Oral Session IV **Alternative Feed Additives for Gut Health;** Chair: Dr. M. Hafez
Thursday Sept. 04, 2014	
09:00a-10:00a	Plenary Session V **Poultry Products and Food Safety;** Chair: Dr. R. Mulder
10:00a-11:00a	Oral Session V **Poultry Products and Food Safety;** Chair: Dr. R. Mulder
11:30a-12:30p	Plenary Session VI **Poultry Housing and Management;** Chair: Dr. T. Elam
12:30-13:15	Oral Session VI **Poultry Housing and Management;** Chair: Dr. T. Elam
14:00p-14:30p	Plenary Session VII **OTHER / Miscellaneous;** Chair: Dr. R. Pym
14:30p-15:45p	Oral Session VII **OTHER / Miscellaneous;** Chair: Dr. R. Pym
16:15p-17:15p	Plenary Session VIII **Other;** Chair: Dr. E. Silva
Friday Sept. 05, 2014	
9:00a-10:00a	Plenary Session IX **Poultry Health: Current Challenges and Future Approaches to Disease Control;** Chair: Dr. R. Akbay
10:00a-10:30a	Oral Session IX **Poultry Health: Current Challenges and Future Approaches to Disease Control;** Chair: Dr. R. Akbay
11:00a-12:00a	Oral Session IX **Poultry Health: Current Challenges and Future Approaches to Disease Control;** Chair: Dr. E. Prukner

Posters Session

There will be one unique session.

The posters will be on display the whole duration of the conference. The authors will be provided with a special note under the poster where they will specify the time and/or schedule when they would be present to discuss their poster and answer questions.

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PLENARY SESSIONS

[A1-01]: 1 - Economic Status of Poultry Industry in the Med. Region (ID: 10093)
[United States]

Egg Market Evolution in the Mediterranean Basin

T. Elam
FarmEcon LLC, Indianapolis, United States of America
Corresponding author: thomaselam@farmecon.com

On a global scale, we are seeing significant, healthy, egg production growth rates in every region except Europe. European growth has been slowed to a crawl by a combination of slow economic and population growth, plus regulations on housing, GMOs and production drug use that have increased production costs. Asia dominates global production by size and tonnage growth. China, accounting for 63% of the 2012 Asia market, and 37% of the world, is by far the most important producer. In the Americas, the U.S. Is the largest producer, but Latin America is the growth leader. European production is less concentrated than other regions, with the most populous countries being the natural leaders. None of the countries in Europe stand out as a growth leader. In Africa just five countries, Morocco, Algeria, Egypt, South Africa and Nigeria, accounted for 69% of production in 2012. These five countries have also seen significant growth over the last decade. Africa is ripe for increased egg production if political issues can be addressed, and incomes grow faster. At population growth of 2.5% per annum, Africa already has an increasing potential for food production in general. With a high percentage of low income families, increased egg consumption would be a natural result of improved living standards. The potential is staggering. If Africans consumed as many eggs per person as Asia, total production would need to grow from the current 3 million tons per annum to about 10 million, roughly in line with Europe. There is little that egg producers can do about the political and economic environment in which they find themselves. Given the turmoil in this region over the past decade, its egg producers have shown amazing resilience. Ability to cope with adversity will likely continue to the a major asset in the years ahead.

Keywords: Egg production, egg consumption, population economics

[A1-02]: 8 - Other / Miscellaneous (ID: 10015)
[Lebanon]

Roles of farmers and governments in reaching self-sufficiency in poultry meat production in the Middle East and North Africa

M. Freiji
Tanmia Holding. Beirut, Lebanon
Corresponding author: tanmia@tanmia.com.lb

Poultry meat consumption has been increasing in all the Middle East and North Africa (MENA) countries at an average rate of 5 % per annum. This is due to an increase in either population or red meat prices relative to that of poultry meat. The source of poultry meat has been from local production and imports. However, the increase in consumption has mainly come from imports even in certain cases at the expense of local production due to lower prices of imported frozen poultry meat. Because of feed ingredients importation, the cost of poultry production in all MENA countries has been comparably high. Regardless of price difference, the phenomenon of engagement of consumers to buy live chickens or freshly dressed ones has maintained a certain sizeable percentage of consumption from locally produced chicken. Currently, the average per capita consumption in the MENA countries does not exceed 16 Kgs/annum of which 10 Kgs are locally produced. Three aspects need to be addressed in order to maintain or increase local poultry meat production: 1) Farmers need to improve production efficiency through the reduction of broiler mortality and feed conversion to less than 5% and 1.65 respectively.2) Governments need to impose protective measures on imports especially to counterbalance agricultural and export subsidies practiced by exporting nations. 3) Governments need to encourage efficient grain and oil seed production in countries like Sudan, Egypt, Turkey, Iraq, Syria, Algeria and others.

Keywords: poultry meat, production, consumption, MENA countries

[A2-01]: 2 - Environment and genetic Interactions (ID: 10082)
[Germany]

Recent advances in layer breeding

D. Flock (1), W. Icken (2), D. Cavero (3), R. Preisinger (4)
(1, 2, 3, 4) Genetics, Lohmann Tierzucht GmbH, Germany
Corresponding author: dkflock@t-online.de

Worldwide demand for animal protein is increasing at a rapid rate, ahead of population growth, due to increasing per capita income in developing countries and changing consumer preferences. More consumers today have a choice of different eggs or egg products: white, brown or tinted shell eggs in different weight grades, liquid (frozen) or dried whole eggs or egg products. Prices for eggs are generally low compared to other sources of animal protein, due to efficient feed conversion and a tendency to overproduce eggs relative to demand. The international egg industry relies on the supply of parent stock from a small number of primary breeders. These companies keep a number of different lines under intense selection and are better than ever prepared to offer line combinations which promise to match the specified demand. Along with the supply of parent stock with defined performance profile, the breeding companies and their distributors offer technical support and training in many ways. In this presentation, general procedures of modern egg-type breeding will be reviewed. Genetic improvement is focused on efficient production of marketable eggs in all lines, but different line crosses are used to realize this target under different local conditions. Individual data from pedigreed hens are collected under a range of environmental conditions, in single and group cages, but also in floor pens with electronic recording of egg production and behavior characteristics. Modern genomic selection has helped to improve egg quality of brown eggs and is expected to further speed up genetic progress. Specified needs of egg producers in the Mediterranean countries will be taken into account with future supply of parent stock.

Keywords: selection, genetic improvement, egg products

[A2-02]: 2 - Environment and genetic Interactions (ID: 10077)

[United States]

Poultry genetic advances provide low cost protein for the increased world population

J. Douglas (1), D. Emmerson (2)
(1, 2) Aviagen, USA
Corresponding author: jdouglas@aviagen.com

Genetic improvement has contributed greatly to the efficiency of poultry production which has supported the growth of the global poultry industry. The industry has benefited from the specialization of the primary breeding companies that are focused on delivering improved genetic stocks. In the early decades of their existence, primary breeders focused on a relatively limited number of characteristics but with the passage of time have greatly expanded the number of traits under selection as the industry has evolved. Over time, breeders have placed greater emphasis on efficiency traits such as feed conversion and meat yield, focused more on welfare characteristics such as leg strength and cardiopulmonary health, developed strategies to reduce environmental sensitivity and selected in a more balanced way to ensure improvement in all areas of interest. Application of technology has driven much of this evolution. Improvements in information technology allow breeders to accurately and cost-effectively record information on a wide variety of traits of interest in very large pedigree populations. Advanced statistical methods provide accurate estimates of the genetic value of pedigree candidates and properly account for the genetic relationships between traits. Medical technologies have allowed breeders to target underlying physiological factors influencing bird health and welfare. Breeders have developed a novel technology to measure individual feed consumption in a group environment which has revolutionized selection for feed conversion. Genomic selection is now providing yet another tool to enhance our ability to select in the most efficient way.

Keywords: Breeding, selection, population, technology, traits

[A3-01]: 3 - Alternative Feed Sources for the Med. Region (ID: 10090)
[Lebanon]

Energy sources in rations of chickens raised under Mediterranean climate

N.K. Usayran (1), N.J. Daghir (2), G.W. Barbour (3), M.T. Farran (4)
(1) Lebanese University, Lebanon; (2, 4) American University of Beirut, Lebanon; (3) Lebanese Agricultural Research Institute, Lebanon
Corresponding author: nadaus@gmail.com

Corn is the most nutritionally and economically acceptable source of metabolizable energy (ME) in poultry rations, but it is occasionally imported at a higher price and lower grade than expected in the Eastern Mediterranean basin. Consequently, attempts to upgrade the ME of poultry rations as well as exploring the usefulness of locally available alternative feedstuffs in feed formulations are underway. In a survey on local commercial feedstuffs, bushel weight (kg), crude protein (CP), fat, fiber, and ash (% dry matter) content of corn were 25.9, 8.54, 3.52, 2.09, and 1.51, respectively denoting a reduced nutritional quality. In a study on moderate ME diets (3,000 kcal/kg), broilers gained more weight and deposited less abdominal fat when the level of soybean oil in a corn-soybean meal diet (control) was increased from 0 to 4%. In another broiler trial, dietary commercial corn (9.55% CP, 4.22% fat, and 3541 kcal apparent metabolizable energy corrected to nitrogen equilibrium/ kg) (AMEn) was replaced with high oil corn (10.1% CP, 7.16% fat, and 3669 kcal AMEn/kg) without affecting performance except for a decrease in abdominal fat pad weight. Similar to earlier research work in other regions, local varieties of barley have been tested for their nutritional and feeding values when fed to broiler chickens. The average CP and true metabolizable energy corrected to nitrogen equilibrium (TMEn) of two frequently cultivated local barley varieties (Litani and Rihan) were 14.0% and 3239 kcal/kg. Performance, carcass quality, and cut-up parts weight of broiler chickens fed a control diet containing 25% of either barley varieties were similar to those fed the control. Moreover, the addition of a specialized enzyme to these diets was found to significantly improve AMEn, weight gain, and feed conversion of broiler chickens while concomitantly increasing abdominal fat pad weight. More research can be done on the energy yielding potential of locally available feedstuffs for feeding poultry. Studies on the use of barley, or other drought-resistant crops, should be pursued aiming at lowering diet cost while maintaining reasonable production of birds.

Keywords: metabolizable energy, soybean oil, corn, barley, poultry ration

[A3-02]: 3 - Alternative Feed Sources for the Med. Region (ID: 10098)

[Austria]

A review on the use of microbes and enzymes for mycotoxin deactivation

U. Hofstetter (1), G. Schatzmayr (2), I. Rodrigues (3)

(1) Biomin Holding, Herzogenburg, Austria; (2) Biomin Research Center, Tulln, Austria; (3) Biomin Singapore, Singapore

Corresponding author: ursula.hofstetter@biomin.net

Mycotoxins are highly toxic secondary metabolic products of fungi mainly belonging to Fusarium, Aspergillus and Penicillium species. Under certain conditions these fungi produce mycotoxins, with the group of trichothecenes (deoxynivalenol, T-2 toxin), zearalenone, ochratoxins, aflatoxins and fumonisins being the most prevalent. Mycotoxins are toxic to both humans and animals and since a large proportion of agricultural commodities is known to be annually affected by them, there is a great concern from the feed and food industries to prevent these toxins from entering the food chain. Prevention techniques on field level, such as crop rotation, tillage, weed and insect control act in a very limited way, oftentimes with unsatisfactory results. Therefore detoxification strategies have been developed to counteract mycotoxins. These strategies can be grouped into three categories: physical, chemical and biological methods. Physical methods such as sorting, washing, de-hulling, thermal treatment, grain milling and irradiation and chemical methods namely the use of acids, bases, oxidants and gases are inefficient, too costly and often destroy or remove essential nutrients from the feedstuff and reduce palatability. Biological methods comprise binding by adsorptive materials as well as microbial inactivation by specific microorganisms or enzymes. Various adsorbents are known to be commonly mixed into the feed in order to selectively bind mycotoxins in the gastrointestinal tract before resorption in the animal takes place. However, the adsorption of mycotoxins is only effective for aflatoxins as the presence of polarity in the mycotoxin molecule is pre-requisite for a successful binding. Biotransformation stands for the conversion of mycotoxins into less or non-toxic molecules by enzymes or microorganisms. This degradation takes place in the gastro-intestinal tract of the animal consuming mycotoxin contaminated feed. Biodegradation or biotransformation is seen as the only effective way to detoxify mycotoxins that can only be poorly bound by adsorbents, namely zearalenone, trichothecenes, ochratoxins and fumonisins.

Keywords: mycotoxins, biotransformation, biodegradation, enzymes

[A4-01]: 4 - Alternative Feed Additives for Gut Health (ID: 10099)
[United States]

Alternative feed additives toward gut health-An overview

M. Sifri
ADM Animal Nutrition, United States of America.
Corresponding author: mamduh.sifri@adm.com

There has been a profound awakening about the importance of gut health recently. That has been evident in many of the high profile scientific conferences such as the 4th Mediterranean Poultry Summit. This presentation is an attempt to provide an outline of concepts and possible assessments in making a decision for using alternative feed additives. This paper will focus on non-medicinal feed additives. Consequently, these alternatives bring new challenges. The immediate questions are; do these products work, what are the limits to the claims? The reality is that these issues are so complex that they defy the ability of modelling experts to resolve. The list of such alternatives is too big to list in this summary. Examples of such products can fall under the general categories of amino acids, antibodies, enzymes, prebiotics, probiotics short chain fatty acids, plant extracts, yeast cell components and other numerous products or sub-products of this. It is essential that an objective assessment is made about all the pertinent effectors. Such effectors can include: Ingredient and nutrient matrix, environment, health, light, feed and ingredient texture, presence of other modifiers, life cycle stage (age), feeding system and structure, animal density, ingredient availability, feed intake pattern, feed management, appetite, animal physiological, species and interactions. It is also a wise approach to recognize:1. An enzyme is not the same as another enzyme bearing the same general name. 2. A yeast product is not the same as another product bearing the same general name. Saccharomyces cerevisiae is not the same as pichia guilliermondii. Since this pichia strain has been researched extensively by the author in collaboration with other scientists and published in refereed journals such as Poultry Science, the reader can review these as a helpful background about how to asses a new yeast known as CitriStim. 3. The same is true for other products.

Keywords: Poultry, Gut Health, Alternatives, CitriStim

[A5-01]: 5 - Poultry Products and Food safety (ID: 10021)
[France]

Egg white antimicrobial proteins: characterization of novel molecules and regulation of egg white activities.

Y. Nys (1), N. Guyot (2), S. Réhault-Godbert (3), J. Gautron (4)
(1, 2, 3) INRA , UR83Poultry unit, Function and Regulation of Egg proteins, 37380 Nouzilly, France; (4) INRA, , UR83Poultry unit, Function and Regulation of Egg proteins, 37380 Nouzilly, France
Corresponding author: Yves.Nys@tours.inra.fr

The egg contains bioactive molecules that are essential for the development and protection of the embryo and useful for human health. The recent analysis of egg constituents by proteomic and transcriptomic approaches allowed the identification of hundreds of minor egg proteins. We purified or synthesized some novel antimicrobial peptides and proteins (AMPP) and characterised their antimicrobial activity against a representative panel of pathogenic bacteria. Two peptides belonging to the defensin family have been identified in the hen egg white: the avian beta-defensin 11 (AvBD11) and the ovodefensin Gallin. Antiproteases are highly represented in egg compartments and we demonstrated some activity against bacteria able to secrete proteases. Ovalbumin-related protein X (OVAX) is an uncharacterized ovalbumin-related serpin with particular structural features that are responsible for its antibacterial properties against Listeria and Salmonella. All these AMPP participate in egg innate immunity. We investigated whether this innate antimicrobial protection was stimulated or not by the degree of contamination of the hen milieu and explored changes in antimicrobial properties of egg white induced by the conditions of egg storage. We compared the global antimicrobial activity of egg whites issued from immune challenged hens or from hens characterized by different immune status germ free (GF), specific pathogen free (SPF) and conventional (C) hens. Egg whites from C and SPF groups showed increased inhibitory activity towards Staphylococcus aureus as compared with the GF group. Similarly, increased antimicrobial activity against this pathogen was observed in egg whites of hens stimulated by LPS or following treatment with live vaccines. These results suggest that hens can moderately enhance the egg white antimicrobial activity in response to microbial stimuli present in their environment. We explored also the influence of egg storage conditions on antimicrobial egg white activity and demonstrated that temperature and duration of storage can initially stimulate some of the antibacterial activities of the egg white. However prolonged storage at temperatures higher than 30°C has detrimental effect on the antibacterial activity of the egg white against bacteria. These approaches may lead to innovative developments aiming to provide new proteins of interest for human or animal health and may reduce the risk of human food poisoning.

Keywords: hen, egg white, antimicrobial proteins, immunity, egg storage

[A5-02]: 5 - Poultry Products and Food safety (ID: 10092)
[Brazil]

The role of Salmonella from chicken origin on human foodborne disease and control measures on the farms

E.N. Silva
WPSA President, Brazil
Corresponding author: edir@fea.unicamp.br

Poultry products are the major cause of foodborne outbreaks associated with Salmonella in the whole world. Several programs have been implemented in attempt to reduce foodborne illnesses and set performance standards for the poultry industry with regards to table eggs and broiler carcass contamination with Salmonella. In some areas, human illnesses associated with Salmonella have not changed despite successes in lowering poultry contamination with Salmonella. Any on-farm intervention strategy for reducing Salmonella prevalence and load in layer flocks or broilers entering the plant requires an understanding of pathogen transmission dynamics within the food production system and identifying an intervention that works. Several interventions have been proposed. Vaccination in the poultry industry is a concern because of adverse vaccine reactions, reduced egg production, and doubts whether Salmonella vaccines actually work. This presentation will review some aspects on this.

Keywords: Salmonella, Human FoodBorne Disease, Control Measures

[A6-01]: 6 - Poultry Housing and Management (ID: 10080)

[Australia]

Small-scale poultry production including organic and free-range with emphasis on the Mediterranean Region

R. Pym
World's Poultry Science Association, Australia
Corresponding author: r.pym@uq.edu.au

Small-scale family poultry farming in developing countries and in countries "In transition", involving either semi-scavenging flocks of mostly indigenous breed poultry in rural regions, or backyard production utilizing a variety of genotypes in peri-urban areas, contributes in a very meaningful way towards the social and financial needs of families. Whilst productivity under the former system is relatively low, so too are inputs which makes the production system reasonably viable. This is evidenced by the many millions of such flocks worldwide. The principal constraint to profitability is the high mortality rate in young chicks, due to a combination of disease, predation, malnutrition and climatic exposure, combined with moderate to high mortality rates in grower and adult stock due to the effects of disease, of which Newcastle disease is a common cause. Many of these constraints are shared by backyard production, but can be significantly influenced by the chosen genotype and the level and quality of husbandry, including feeding, housing and disease control. Simple cost effective interventions involving vaccination of the flock against Newcastle disease with heat tolerant vaccines, combined in the case of semi-scavenging flocks, with early confinement of the chicks with the hen and creep feeding over the first three to four weeks, have been demonstrated to impact dramatically the survival of the birds and the household food security and profitability. Improvements to productivity and profitability in the above systems, are not incompatible with the development of the commercial poultry meat and egg industries in developing countries to meet the needs of the urban and peri-urban populations. Family Poultry raising is making a resurgence in many "developed" countries. The number of families raising backyard poultry is on the increase due to both a growing enthusiasm for organic poultry products and the depressed economic circumstances in many countries. Backyard production systems vary according to local government regulations, producer preferences, household residential circumstances and climatic conditions.

Keywords: Small-scale family poultry production

[A6-02]: 6 - Poultry Housing and Management (ID: 10089)
[Turkey]

Heat tolerance in broilers and strategies for heat stress management

S. Yalcin
Ege University, Faculty of Agriculture, Turkey
Corresponding author: servet.yalcin@ege.edu.tr

Higher temperature is a significant issue affecting broiler production in Mediterranean countries, because more intense heat waves are expected under future climate change in the region. Broilers maintain their deep body temperature within a relatively narrow range of ambient temperature which is 18 and 22° C from 21 d to slaughter age. When the ambient temperature is higher than optimum, the heat produced by a bird is greater than the amount it loses, then the bird cannot maintain body temperature. Besides, selective breeding for rapid growth rate increased susceptibility to higher temperatures because today's commercial broilers eat more and generate more metabolic heat causing a higher body temperature. Heat stress affects live performance reducing body weight gain, increases mortality, has negative impact on welfare, and meat quality, and thus adversely affects the profit from the enterprise. Under high temperature conditions, birds alter their behavior (spend less time feeding, more time drinking and panting), and physiological homeostasis (elevated plasma corticosterone concentrations, decreased T3 concentrations, reduced lipolysis, and enhanced amino acid catabolism) seeking thermoregulation. Therefore, it is important to manage heat stress to successful broiler production and welfare. During the past two decades there has been a great deal of research to reduce the adverse effects of high temperature on broilers. Genetic strategies to improve heat tolerance may be 1. to introduce naked neck (Na) and frizzle (F) genes to reduce feather coverage which enhances heat dissipation, and 2. Selection for heat tolerance. Feed restriction during heat stress and reducing stocking density are effective management tools to reduce heat production of broilers under heat stress. Thermal manipulations during incubation and early postnatal stage, seem to be promising methods in enhancing the heat tolerance of broilers, however, these are still the experimental stage.

Keywords: Heat stress, broilers, thermal manipulations, incubation

[A7-01]: 7 - Other / Miscellaneous (ID: 10023)
[Egypt]

Antioxidative and immunological effects of propolis extract on growing Japanese quail

Y. Eid (1), A. Kirrella (2), T. Ebeid (3), S. Abou El-Soud (4), M. El-Habbak (5)
(1, 2, 3, 4, 5) Department of Poultry Production, Faculty of Agriculture, Kafrelsheikh University, 33516 Kafr El-Sheikh, Egypt
Corresponding author: yahya.eid@agr.kfs.edu.eg

A total of 405 one-week-old Japanese quail chicks were divided randomly into three treatments (n= 135) with three replicates each. The first group (LP) was given 8 ml propolis extract / 1000 ml drinking water, the second group (HP) was given 16 ml propolis extract / 1000 ml drinking water and the third group was served as control and provided with fresh water without any supplements. Body weight gains were not significantly affected by any level of propolis compared to the control one. The same trend was observed in feed consumption and feed conversion. Tenderness was the only trait of the breast meat that was significantly affected by propolis treatments where the highest values of tenderness (4.81+0.06 / cm2)were detected in the highest level of propolis as compared with control (3.76+0.18 / cm2). Propolis treatment for 6 weeks did not significantly change plasma globulin and AST. Plasma cholesterol and ALT content were significantly decreased, while plasma total protein, albumin and HDL cholesterol were significantly increased as compared with the control. Propolis in drinking water significantly ($p \leq 0.001$) decreased lipid peroxidation based on MDA values after 6 weeks of propolis treatment as compared with control. Also, statistical analysis showed significant increase in total antioxidant capacity in the propolis treated birds. Propolis had a positive effect on humoral immunity as measured by antibody titers against NDV when compared with the control treatment. It could be concluded that inclusion of propolis in drinking water of Japanese quail improved the antioxidative status, reduced lipid peroxidation and enhanced the antibody response. Additionally, the current study confirmed that propolis treatment did not have a negative influence on other physical characteristics and the chemical composition of meat.

Keywords: Propolis extract, performance, antioxidative activity, immunity, Japanese quail

[A8-01]: 1 - Economic Status of Poultry Industry in the Med. Region (ID: 10014)
[Lebanon]

Roles of poultry farmers and governments in activating biosecurity measures

M. Freiji
Tanmia Holding. Beirut, Lebanon
Corresponding author: tanmia@tanmia.com.lb

The emergence of high and low pathogenic Avian Influenza, Virulent New castle and Variant Infectious Bronchitis since 2004 had a profound effect on the commercial poultry industry as well as on the rural and backyard poultry. Much of the spread of these diseases occurred due to lack or insufficient Biosecurity measures taken by poultry keepers, or imposed by government authorities. While stamping out or vaccination measures have reduced the spread of these diseases so far, it seems that insufficient Biosecurity measures in many countries is keeping the viruses circulating and the diseases threatening all poultry keepers or farmers. Thus scientists and government officials are still concerned about the possible mutation of the HPAI virus to a state where it causes a pandemic. This concern is instigating governments, especially in the developing world, to take abrupt and drastic measures towards poultry producers, especially in the commercial sector, which are interrupting production without actually solving the spread of the disease problem. We have not witnessed, so far, decisive measures by any government around the globe to enforce appropriate vaccination where it is necessary or Biosecurity measures in order to reduce the possibilities of the further spread of the viral diseases, especially further mutation of the Avian Influenza virus. This paper will deal with the detailed Biosecurity measures that need to be enforced by legislation and implementation by governments, especially in the developing countries where fair compensation is difficult to adopt and hence stamping out policies do not work. The paper will also detail Biosecurity measures that farmers need to implement in order to reduce their losses and turn their poultry operations to profitable enterprises. The paper will also list the roles of FAO and OIE in this endeavour.

Keywords: Avian Influenza, Activating Biosecurity Measures, Governments

[A8-02]: 8 - Other / Miscellaneous (ID: 10094)
[Lebanon]

The role of poultry meat and eggs in the Mediterranean diet

C.H. Mourad
American University of Beirut, Lebanon
Corresponding author: ch18@aub.edu.lb

The Mediterranean Diet is based on the traditional foods eaten by people living in the Mediterranean region. It includes lots of fruits, vegetables, legumes and nuts, olive oil, whole grains, fish, some poultry, eggs and very little red meat. Although populations living in this region tend to eat a diet high in fat, they have a much lower incidence of cardiovascular disease and cancer compared with people in other parts of the world. This can be explained by the high fiber and antioxidants content of the Mediterranean diet, and the lower content in saturated fat. Animal protein foods like meat, fish, poultry and eggs provide all the essential amino acids the body needs in order to repair and rebuild muscle tissue. These foods are excellent sources of iron, zinc and a variety of B vitamins; however they are also rich in saturated fat. Current evidence suggests that Poultry may be a better choice than red meat. Recent studies showed that high red meat consumption is associated with an increased risk of total, CVD, and cancer mortality. Evidence from cohort studies confirmed that colorectal cancer risk was positively associated with intake of red and processed meat, and inversely associated with intake of fish, but was not related to poultry intake. Substitution of other healthy protein sources (fish, poultry, legumes) for red meat was associated with a lower mortality risk. Packed with a number of nutrients, Eggs do contribute saturated fat and cholesterol, but latest evidence showed that moderate intake is acceptable. Eggs and poultry have always been an important part of Mediterranean cuisine; they are commonly used within casseroles, combined with vegetables and beans. This combination has been linked to better health as it provides important nutrients - antioxidants, fibers, complete protein- and lower saturated fat associated with decreased mortality.

Keywords: Mediterranean diet, eggs, poultry

[A9-01]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10095)
[Germany]

Current challenges and future approaches to disease control

M. Hafez
Institute of Poultry Diseases, Freie Universität Berlin. Institute of Poultry Diseases, Germany
Corresponding author: hafez@vetmed.fu-berlin.de

Currently several factors and problems face and influence the poultry production worldwide and some of them will remain also in future. These include: strong global competition, continuous changes in political and consumer perceptions with regard to food safety, animal welfare and environmental protection. The loss of consumer confidence and trust in the quality and safety of poultry meat and poultry products will remain a major challenge. In developing countries, the need to produce sufficient food to meet the requirements of population increases, accompanied by bad economic situations often overshadow the need to ensure safe food products. Regardless of this fact, safe food is a fundamental requirement for all consumers, rich or poor. In addition the use and misuse of antibiotics cause staidly increase of antibiotic resistant bacteria, which is a continuous public health hazard. Emergence and re-emergence of infectious poultry diseases will remain an important non-ending challenge. In future improvements in laboratory diagnosis will allow faster, more sensitive and more accurate diagnosis, which allows early interventions, will become a reality. On the other hand only a few authorized pharmaceutical veterinary products will be available for the treatment of poultry as food producing animals. Future scientific findings on the pathogenic mechanisms of bacteria will help to improve the treatment of bacterial infections, and instead of non-specific antibiotic therapy, new drugs will be able to target the signalling mechanisms, which are able to disrupt the pathogenic effects of the pathogen bacteria. Vaccination today and in future is regarded as one of the most beneficial interventions to prevent diseases. Many valuable new vaccine production technologies have been developed as a result of rapid progress in various areas. The use of future progressive vaccine production technologies, such as recombinant, subunit, reverse genetic and nucleic acid vaccines, can significantly reduce the cost of vaccines, ensure better efficacy, and allow easy and rapid intervention to face the steady mutation of the microorganisms. Furthermore, the development of efficient vaccines against bacterial infections will lead to a reduction of the use of antibiotics and subsequently will reduce the development of resistant bacteria. The future concept of animal health will cover not only the absence of disease in birds, but also the relationship between the health of animals and their welfare. The genetic resistance and selective breeding to improve production traits and health is a long-standing goal of the poultry industry. In addition, improvement of rearing technology, management and nutrition will help to maintain bird comfort. In general, consumer expectations for high quality products will strongly influence future production methods. This means that farmers, veterinarians, stockholders and all other partners involved in the production chain need to share more responsibilities. The present paper explores these points.

Keywords: Poultry products, developing countries, disease control

[A9-03]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10054)

[Egypt]

Molecular evolution of respiratory viruses in broiler chicken mixed infections demonstrating mortality

H. A. Hussein

Department of Virology, Faculty of Veterinary Medicine, Cairo University, Egypt

Corresponding author: husvirol@link.net

Four patterns of viral infections demonstrating varied mortality in broiler chicken are currently common in the field. Co-circulation of respiratory viruses in broiler with different pathogenicity enhances the possibility of increasing mortality. Circulation of recent variant field strains of IBV with varies pathogenicity provide important factors which play a major role of increased pathogenicity of both NDV(Newcastle disease) and AIV(Avian Influenza Virus) in case of mixed infection with such viruses. Recent studies on the prevalence of such viruses in Egypt reported the major role of IBV variant strains co-infected with NDV and /or AIV (H5N1 or H9N2). Trypsin-like serine protease domain encoded by IBV may provide the key factor of increasing the pathogenicity of H9N2 of AIV. Secondary bacterial infections of pathogenic E.Coli and mycoplasmas in these mixed viral infection are also important and reported in the majority of mixed viral infection cases. Indeed, We will discuss the role of IBV variant strains recently reported in several Middle Eastern countries suggest the major contribution of mixed strain infection with NDV and AIV as a major cause of mortality in the broiler sector. These infections started to increase in the last 3 years.

Keywords: IBV variant strain, NDV VIId, H5N1, H9N2, Mixed infection

ORAL SESSIONS

[O2-01]: 2 - Environment and genetic Interactions (ID: 10069)
[Tunisia]

Animal genetic resources: Studies of the phenotypic diversity of the local population of chicken

S. Derouich (1), M. Ben Hammouda (2)
(1) Dep of animal production, ISA Chott-mariem university of Sousse, Tunisia; (2) IRESA tunisia
Corresponding author: derouichsihem@yahoo.fr

Genetic resources are among the most valuable and strategically important assets that a country possesses, and domestic poultry is one of the livestock breeds that contribute greatly to food production. This study aims to produce a report on the domestic poultry of four governorates in central-eastern Tunisia (Sousse, Monastir, Mahdia and Kairouan). The study includes: a survey of genetic diversity and phenotypic traits of domestic poultry; evaluation of housing systems; estimating the value of local and exotic breeds in genetic improvement, in the context of livestock development; estimating the impact of traditional farming systems on genetic resources; and evaluating the role of women and men in managing these resources and contributing to rural development. This study examines the phenotypic traits (feather color, type and distribution; color of the eyes, feet, ears and beak) of 508 individual domestic chickens (98 males and 410 females). The data reveals that there is significant genetic and morphological diversity, reflecting the importance of this stock in the development and preservation of animal genetic heritage.

Keywords: Genetic, domestic poultry, phenotypic traits

[O2-02]: 2 - Environment and genetic Interactions (ID: 10055)

[Libyan Arab Jamahiriya]

Assessment of Response to Selection in Pure Lines of Commercial Broiler's Strain (Aseel)

E.K. Gerish (1), L.E. Mansour (2), A.E. Dardour (3)

(1, 2) Al Kaswa wa Al Adba Centre for Animal Health- Tripoli, Libya.; (3) At Tawisha Poultry Project, Qaser Ben Ghasheer, Libya.

Corresponding author: aqurish2001@yahoo.com

This study is based on the records of 10 flocks of four pure lines of hybrid commercial broiler strain (Aseel) from 2002 to 2010, a national project to consolidate the Broiler Breeding Center/Tarhuna (BBCT), Libya. The aim was to evaluate the response to selection for body weight at 6 weeks of age. In line C the heritability estimates were: 0.16 for body weight at 6 weeks of age, 0.15 for egg number and 0.24 for egg weight at 40 weeks of age. In line D the values were: 0.23 for body weight at 6 weeks of age, 0.24 for number of eggs, and 0.19 for egg weight at 40 weeks of age. In line C the values of phenotypic, genetic and environmental correlations between body weight at 6 weeks of age and number of eggs at 40 weeks of age were as follows: - 0.066, - 0.20 and - 0.04; between body weight at 6 weeks of age and egg weight at the 40 weeks: 0.021, - 0.19 and 0.02; between number of eggs and egg weight at 40 week of age: 0.0055, 0.044 and - 0.004, respectively. In line D, the phenotypic, genetic and environmental correlation between body weight at 6 weeks of age and number of eggs at 40 weeks of age were: - 0.17, - 0.36 and - 0.12; between body weight at 6 weeks of age and egg weight at 40 weeks of age 0.065, 0.33 and - 0.006; between egg number and egg weight at 40 weeks of age: 0.0048, - 0.23 and 0.06. We conclude that genetic response to selection for body weight at 6 weeks of age was achieved in these lines, but environmental conditions prevented this progress from being expressed in other flocks, suggesting a barrier in genetic response due to environmental conditions. The selection conducted in the flocks was carried out in scientific ways and by trained specialists. The results obtained in our study may be considered as a reference in the development of future plans and programs for the genetic improvement of broiler breeding under local conditions.

Keywords: Response to selection, Pure line, Aseel strain, Libya

[O3-01]: 3 - Alternative Feed Sources for the Med. Region (ID: 10017)
[Iran (Islamic Republic of)]

Effects of simultaneous increase in Lysine, Methionine and Threonine levels on performance and efficiency of male broilers up to ten days of age

J.Nasr
Department of Animal Science, Saveh Branch, Islamic Azad University, Saveh, Iran
Corresponding author: javadnasr@iau-saveh.ac.ir

This research evaluated how simultaneous increase in lysine, methionine, and threonine densities in starter phase (0-10d) of male broilers affects performance, protein and energy efficiency ratios, and efficiency of lysine, methionine and threonine. At day 1, 480 Ross 308 male chicks were placed in 24 floor pens (20 chicks per pen, 0.12m2/bird). Four treatments (6 replicates per treatment) with different levels of lysine, methionine and threonine density, namely, Standard (100% NRC), Medium (115% NRC), High (130% NRC), and Very High (145% NRC) were used in a completely randomized experimental design. In broilers fed with the High (130%NRC) diet, the body weights at 3 and 10d of age were increased by 11.13 g (14.58%) and 39.69 g (16.4%), respectively compared with standard group ($P<0.01$). Feeding broilers with 145% NRC diet had the lowest feed intake ($P<0.001$) and feed conversion ratio ($P<0.05$) at 3, 7, and 10d of age compared to the other diets. Protein and energy ratios were significantly lower in the Standard diet at 3, 7, and 10d of age compared to the other diets. Supplementing basal diet with extra Lys, Met and Thr simultaneously, significantly increased lysine, methionine and threonine intake; lysine, methionine and threonine conversion ratio in spite of decreased feed intake, protein intake and energy intake in starter period. The results of this study suggested that additional 30% Lys, Met and Thr above NRC levels in broiler starter diets significantly improved performance, protein, and energy efficiency ratios ($P<0.05$).

Keywords: Broiler, Essential amino acids, Performance, Efficiency

[O3-02]: 3 - Alternative Feed Sources for the Med. Region (ID: 10030)
[Iran (Islamic Republic of)]

The effect of dietary different sources of zinc on growth performance, indices of digestive and immune organs and total immunoglobulin of broiler chickens during starter stage

F. Ahmadi (1), Y. Ebrahimnezhad (2), N. Maheri Sis (3), J. G. Ghaleh Kandi (4)
(1) Department of Animal Science, college of Agriculture, Sanandaj Branch, Islamic Azad University, Sanandaj, Iran; (2, 3, 4) Department of Animal Science, college of Agriculture, Shabestar Branch, Islamic Azad University, Shabestar, Iran
Corresponding author: far536@yahoo.com

This study was conducted to determine the effect of two sources of zinc (Zn) on performance, digestive and immune organs and total Ig titers of broiler chickens. A total of 720 one-day male broilers (Ross-308) distributed in a completely random design consisted of three statistical experimental populations with four Zn inclusion rates per population and four replicates (of 15 birds in each) per inclusion rate. Experimental populations were: P1) Control (basal diet and without supplementation); P2) basal diet + different levels of Zinc oxide (30, 60, 90 or 120 mg zinc oxide/kg, respectively); and P3) basal diet + different levels of Zinc oxide nanoparticles (Zno-NPs) (30, 60, 90 or 120 mg/kg, respectively). Body weight gain (BWG), feed intake (FI) and feed conversion rate (FCR) were recorded on a weekly basis and study duration was for 21 days. At the end of study 12 birds (4 birds per population) with body weight closest to treatment mean were selected, bled from vein wing vein then slaughtered for fat pad, small intestine, pancreas, Bursa of Fabricious and spleen removal. Blood samples were centrifuged and extracted serum stored in -20°C till total Ig analysis. The results indicated that dietary Zno-NPs had significantly increased BWG and FI ($P<0.05$) and decreased ($P<0.05$) FCR as compared to Control (P1) and P2 birds. Relative weight of fat pad, small intestine and pancreases had significantly decreased ($P<0.05$) in birds fed diets supplemented with Zno-NPs (P3) in comparison with Control (P1) and P2. Also, relative weight of Bursa of Fabricious (0.16) and spleen (0.36) in P3 birds were higher ($P>0.05$) than those of Control (P1) and P2. The highest ($P<0.05$) of total Ig titer was observed in Zno-NPs-supplemented birds as compared to the other populations. In conclusion, results of the present research indicated that dietary zinc oxide nanoparticles improved growth performance and increased total Ig titers in starter broilers.

Keywords: broiler, zinc oxide, nanoparticles, Ig, perform

[O3-03]: 3 - Alternative Feed Sources for the Med. Region (ID: 10010)

[Lithuania]

Nutritional and chemical composition of different triticale genotypes

V. Kliseviciute (1), R. Gruzauskas (2), A. Raceviciute-Stupeliene (3), S. Bliznikas (4), C. Relandeau (5)
(1, 2, 3, 4) Department of Animal Sciences, Lithuanian University oh Health Sciences, Lithuania; (5) Adisseo France SAS, 92 160 Antony – France.
Corresponding author: kliseviciute@lva.lt

Triticale is a hybrid obtained by crossing wheat and rye and is grown successfully in many regions of the world where it may replace conventional cereals as a staple food. Triticale is considered to be a competitive feed grain to wheat, corn, sorghum and barley. Triticale is a convenient feed for all animals representing a high source of energy and a higher percentage of protein and lysine compared to the parental species. Nutritional value of triticale depends on many factors such as genotype, conditions of climate and fertilizer applications. The aim of the analysis was to determine the nutritional composition of different triticale genotypes. Eleven different genotypes of triticale, with known growth conditions were analysed by the following methods: total and phytin phosphorus – by spectrophotometry, micro elements (copper, manganese, zinc, iron, selenium) – by AA spectrometer; pentosans were hydrolyzed with 4.15 N hydrochloric acid till furfurol and then distilled. The color reaction with aniline acetate was used. Absorption carried out at 530 nm, using Cerning J. and Giulbot A. (1973) method. β-glucans were determined according to Cleary and Codd (1991), flavonoids and phenolic acids (vanillic acid, sinapic acid, p-coumaric acid, ferulic acid, p -hydroxybenzoic acid) - by HPLC. The results showed that the average of values were as follows: total phosphorus - 0.27%, phytin phosphorus - 0.22%. Copper – 3.43 mg/kg DM, manganese – 15.00 mg/kg DM, zinc – 18.89 mg/kg DM, iron – 30.22 mg/kg DM, selenium - 0.08 mg/kg DM. Pentosans – 5.44 %, β-glucans – 0.44 %. Flavonoids (Tricin) - 0.51 μg/g DM. Vanillic acid – 3.91 DM mg/kg, p-coumaric acid – 8.56 DM mg/kg, ferulic acid – 458.69 DM mg/kg, sinapic acid – 76.54 DM mg/kg, p-hydroxybenzoic acid – 3.60 DM mg/kg. This work was financed by the Ministry of Agriculture of the Republic of Lithuania project MT 11/30.

Keywords: Triticale, genotypes, nutritional value

[O3-04]: 3 - Alternative Feed Sources for the Med. Region (ID: 10075)
[Egypt]

Utilization of Moringa (Moringa oleifera) leaves as a none-traditional feedstuff on the productive performance of broiler chicks

M. A. ELDeeb (1), N. M. Essa (2), M. Younis (3), A. A. Saleh (4)
(1) College of Agriculture, Assiut University, Egypt; (2, 3) College of Agriculture, Al Azhar University, Egypt; (4) College of Vetranry, Assiut University, Egypt
Corresponding author: eldeeb3@yahoo.com

The effects of feeding Moringa Oleifera leave meals (MOLM) as a non-traditional feed on performance and immune response were studied in broiler chicks raised on floor litter from 1 till 5 weeks of age. A total of 132 broiler chicks of Cobb strain were distributed into 3 treatments (44 chicks/ treatment) with 4 replicates per treatment and 11 chicks per pen. Dietary MOLM levels of 0, 2, and 4% were supplemented to a basal ration (control) containing 22.4% crude protein and 3100 Kcal/kg metabolizable energy so that the three diets were isocaloric and isonitrogenous and met the requirements of broilers for all essential nutrients. Results indicated that at 4 weeks of age, body weight of birds fed the 2% MOLM was numerically higher than those of both the control and 4% MOLM. At 5 weeks of age, however, the body weight of birds offered the 4% dietary MOLM, was lowered (P<.05) by 3.6 and 2.4% as compared to the control and 2% MOLM, respectively. Feed conversion values of all treatments were comparable at 4 weeks of age, but at 5 weeks, 4% MOLM resulted in a cumulative value (2.7) that was significantly higher (P<.05) than both control and 2% MOLM (2.3 and 2.4, respectively).Weight of bursa and thymus as percentage of body weight was improved in broilers offered the 2% dietary MOLM. Spleen and thyroid percentage weights, however, were not affected by the dietary inclusion of MOLM. Compared to the control, weight of abdominal fat (absolute and percentage of body weight) decreased by increasing the dietary MOLM inclusion rate. In conclusion, MOLM could be incorporated at 2% in broiler diets.

Keywords: Keywords: Broiler, diet, performance, MOLM , immune response, histological study

[O4-01]: 4 - Alternative Feed Additives for Gut Health (ID: 10079)

[Egypt]

Effect of using active effective microorganisms as an alternative antibiotics in domestic fowl's nutrition

M. H. El-Deep (1), M. A. M. Sayed (2), K. Amber (3)

(1, 2) Animal Prod. Inst. Agric. Res..Center , Ministry of Agric, Egypt.; (3) Poultry Production Dept, Faculty of Agric, Kafr El-Sheikh Univ, Egypt*.

Corresponding author: mheldeep1980@yahoo.com

The main objectives of this work were to investigate the effect of the addition of two probiotics, (effective microorganism (EM) and Zinc bacitracin) to the diets of Inshas chickens on growth performance, immunity, blood constituents, semen quality and economical benefit. The experimental design consisted of six experimental groups: control and 5 dietary treatments as follows; (T1) Basal diet (control), (T2) Basal diet + EM (2.5 ml/kg diet), (T3) Basal diet + EM (5.0 ml/kg diet), (T4) Basal diet + EM (7.5 ml/kg diet), (T5) Basal diet + EM (10.0 ml/kg diet) and (T6) Basal diet + Zinc bacitracin (500 mg/kg). The investigated Characteristics included : growth Performance , Egg production performance, Egg quality, Egg chemical analysis, Semen quality, Fertility, hatchability and chick weight, Some blood constituents, Antioxidant Enzymes, Hematological Parameters, Bacteria Enumeration , Immune response, Digestibility Coefficients, Morphometric Analysis of the Gut and Histopathology. The obtained results could be summarized as follows:

1- All traits studies were affected by feed additives treatment.

2- The two feed additives studied showed significant beneficial effects nearly in all traits studied.

3- In most cases the best improve effects were obtained with Basal diet + EM (10.0 ml/kg diet).

4- In many cases Zinc bacitracin seemed to be less effective than the EM.

Keywords: effective microorganism - poultry -immunity

[O4-02]: 4 - Alternative Feed Additives for Gut Health (ID: 10005)
[Belgium]

Efficacy of butyric acid glycerides and glycerol monolaurate to combat bacterial enteritis problems in broilers

H. Van Meirhaeghe (1), T. Rogge (2), J. Roelandt (3), J. De Gussem (4), A.L. Rodriguez (5), M.De Gussem (6)
(1) Vetworks, Belgium; (2, 3) Proviron; (4, 5) Poulpharm; (6) Vetworks
Corresponding author: hilde.vanmeirhaeghe@vetworks.eu

Since the ban on antimicrobial growth promoters in EU, more than 50% of antibiotics treatments given to broilers are because of gut health related problems, mostly bacterial enteritis (BE). The signs of BE are loss of performance, higher feed conversion rate (FCR), and macroscopic and histologic alterations of the intestines. There is a growing need to find natural effective and nontoxic alternatives to antibiotics to prevent the disease. The objective of the two trials was to evaluate the efficacy of butyric acid glycerides and glycerol monolaurate for the control of BE in broilers. To provoke BE in floor pen conditions, feeds rich in non-starch polysaccharides and energy were given during grower and finisher phase. ProvifeedTM products were given in feed from day 0 to 42. Body weight gain, FCR and histopathological lesions were determined for different treatment groups and compared to the control group and the antibiotic treated (0.04 mg/ml tylvalosin in drinking water) control group on BE feed. On average, broilers treated with a specific mixture of glycerides of butyric acid and glycerol monolaurate have shown up to 8.8% higher End Weight ($P < 0.1$), 3.3 % improvement in FCR and the best histological scores for BE. Our trials demonstrated that ProvifeedTM can be considered as potential alternative to antibiotic treatment of BE in broilers.

Keywords: Bacterial Enteritis, organic acids

[O4-03]: 4 - Alternative Feed Additives for Gut Health (ID: 10053)
[Switzerland]

Evaluation of the Eubiotic feed additive CRINA® Poultry plus as an alternative to antibiotic growth promoters in broiler diets

M. Wiemann (1), P. C. Aristimunha (2), A. P. Rosa (3), L. S. Boemo (4), D. P. Rosa (5), P. Fidiarakis (6), D. C. Garcez (7)
(1) DSM Nutritional Products, Kaiseraugst, Switzerland; (2, 3, 4, 5) Department of Animal Science, Federal University of Santa Maria, Brazil; (6) DSM Nutritional Products, Athens, Greece; (7) DSM Nutritional Products, São Paulo, Brazil
Corresponding author: matthias.wiemann@dsm.com

Based on consumer perception and strategies to reduce resistance of antibiotics the usage of antibiotic growth promoters is nowadays questioned in poultry nutrition. For maintaining good performance levels and gut health eubiotic feed additives as organic acids, essentials oils, probiotics, prebiotics and combinations of those are considered as alternatives. An experiment was conducted to evaluate the addition of CRINA® Poultry Plus (CPP), a formulation of essential oil compounds and benzoic acid, to broiler diets based on corn and soybean meal and its action as an alternative to antibiotic growth promoters. 1550 one-day old Cobb 500 males were randomly assigned to 5 treatments in 10 replicate pens of 31 birds each. The birds were housed on reused litter to provide a sanitary challenge. The diets were: NC- negative control, without growth promoters; PC- positive control, with 10 ppm of Avilamycin (AVI); CPPD- with 300 ppm of CPP from 1-42 days; AVI(1-21d)/CPP(22-42d)- with 10 ppm Avilamycin from 1-21 days followed by 300 ppm of CPP from 22-42 days and AVI+CPP (1-42 days) with 10 ppm Avilamycin and 300 ppm of CPP throughout the entire 42 days of trial period. All diets had the same nutrient levels and were fed as mash with ad libitum access. The data were submitted to ANOVA and Tukey's test. The CPPD diet increased significantly body weight gain (2519g) in the 42 days trial period compared to birds fed the NC diet (2384g) and PC diet (2440g). In relation to NC, all other groups showed significantly better feed conversion rates on the 1-42 days period and significantly better European productive efficiency index. The NC group showed lower result in gut length than PC and AVI + CPP (1-42 days). The lesion scores by E. acervulina was highest in the NC group and other groups did not show significant differences. No significant differences were found in relation to the development of E. maxima and E. tenella. The results suggest that CRINA® Poultry Plus can be used as an alternative product to antibiotic growth promoters in broiler diets without losses in productive performance.

Keywords: alternative growth promoters, broilers, organic acid, animal performance, essential oils

[O4-04]: 4 - Alternative Feed Additives for Gut Health (ID: 10086)

[United Kingdom]

Effect of a unique carrier-based organic acid blend (Salkil) on the performance of broiler breeders and their progeny.

L. F. Araújo (1), C. S. S. Araújo (2), L. M. Sá (3), I. Cockshott (4), E. N. Graystone (5), L. J. Broom (6)

(1, 2) University of São Paulo – Pirassununga Campus, Brazil; (3, 4, 5, 6) Anparo PLC, Manton Wood Enterprise Park, Worksop, Nottinghamshire, UK

Corresponding author: leon.broom@anparo.com

The profitability of breeding operations is determined by broiler breeder performance. The antimicrobial effects of organic acids mean that their supplementation into the diets of poultry is recognised as an effective method of controlling microbial growth, leading to improved bird health and performance, and safer meat products. Moreover, organic acids improve nutrient digestibility and mineral availability. The objective of this study was to evaluate the effects of a commercially available organic acid product (Salkil) on the performance of broiler breeders. At 25 weeks of age, 64 Cobb 500 broiler breeders were randomly allocated to one of two treatments, with 8 replicates of 4 birds per treatment. The treatments were standard broiler breeder diets with or without the addition of an organic acid blend (Salkil). At 45 weeks of age, the birds were artificially inseminated and eggs were collected between the third and tenth day and incubated. Candling was performed 10 days after incubation for the detection of infertile eggs. One-day old male broilers from both treatment groups were then followed through to 42 days of age, with all birds receiving the same starter, grower and finisher diets (i.e. no organic acid supplementation). In terms of breeder performance, organic acid supplementation improved fertility (96.64 vs. 94.32%; P=0.038). Egg production and hatchability of fertile eggs were not different between treatment groups. With regards to broiler performance, birds from organic acid supplemented breeders had better weight gain to 42 days (2934 vs. 2842g; P=0.024) and feed conversion ratio (1.74 vs. 1.80; P=0.033). Feed intake was not different. The organic acid product improved broiler breeder fertility and the performance of their progeny. The magnitude of the responses observed would equate to significant improvements in profitability for either a breeder and/or broiler operation.

[O4-05]: 4 - Alternative Feed Additives for Gut Health (ID: 10091)
[Germany]

Effect of exogenous protease on the top of amylase and xylanase on broiler performance and amino acid digestibility

K. Okasha
Danisco Animal Nutrition, DuPont, Germany
Corresponding author: khaled.okasha@dupont.com

Consumption of meat is expected to rise from 269 million tonnes in 2000 to a possible 320 million tonnes by 2020, and an estimated 30% increase is planned in egg production. Meat demand in the developing countries should double by 2020. The price of the main feed ingredients (protein and energy sources) has dramatically increased in the last 10 years, placing poultry producers and nutritionists under pressure to implement new strategies to optimize the cost of meat and eggs. Feed enzymes have been used successfully in poultry feed for more than 30 years improving bird performance, reducing feed costs and maximizing profitability. The nutritionist needs to determine the appropriate enzymes depending on the main substrates present in the feed. In this respect, xylanase and amylase have been widely used in poultry feed to break down arabinoxylans and starch respectively, and thereby increase nutrient availability. In the last decade, protein and amino acid requirements have increased through genetic selection for high levels of performance expressed as growth and FCR. The price of vegetable protein sources is highly volatile and the supply limited highlighting the interest of using a protease in poultry diets. Proteases are enzymes that break down proteins into amino acids, but each protease has specificity in its mode of action. Proteases are used to improve protein and amino acid digestibility by the hydrolysis of storage proteins and to disrupt interactions between protein and starch in corn. At the same time, some proteases reduce the level of residual anti-nutrients e.g. trypsin inhibitors and lectins to reduce endogenous losses. Feed cost is reduced considerably with the inclusion of proteases through a reduction in crude protein and first limiting amino acids. An increased use of protease is expected not only from the aspect of economic gain but also from the environmental point of view, as protease enhances amino acid and protein digestibility, with the potential to reduce ammonia emission in poultry houses. The aim of this article is to explore the effect of a combination of xylanase, amylase and protease on nutrient utilization, performance and health status of poultry.

Keywords: Protease, Amino acid, Protein, enzyme, performance, poultry

[O4-06]: 4 - Alternative Feed Additives for Gut Health (ID: 10050)

[Pakistan]

Wild Rue (Peganum harmala L.) extract controls Coccidiosis in broiler chicks.

A. J. Tanweer (1), N. Chand (2), U. Saddique (3), C.A. Bailey (4), S. Khan (5), M. S. Qureshi (6), A. Sultan (7)

(1) Gomal College of Veterinary Sciences, Gomal University, Dera Ismail Khan, Pakistan; (2, 3, 5, 6, 7) Faculty of Animal Husbandry and Veterinary Sciences, University of Agriculture, Peshawar, Khyber Pakhtunkhwa, Pakistan; (4) Poultry Nutrition and Distance Learning, Texas University, USA.

Corresponding author: drjabbbar@yahoo.com

Organic farming of poultry has increased in recent years as the prophylactic use of antibiotics has come into disfavor. This study was conducted to explore the effect of a methanolic extract of Peganum harmala L. (P. harmala) which is commonly known as wild rue as coccidiostat in broiler chicks. For this purpose 150 one week old broiler chicks were divided into 5 treatment groups; Ph 0/NC (negative control), Ph-0/C (positive control), Ph-200/C, Ph-250/C and Ph-300/C getting methanolic extract of P. harmala at the rate of 0, 0, 200, 250 and 300 mgL-1 of drinking water respectively. Each group had three replicates of 10 chicks each. Groups Ph-0/C, Ph-200/C, Ph-250/C and Ph-300/C were challenged orally with coccidia (E. tenella) at the dose rate of 20,000- 30,000 oocysts per bird at the age of 16 days. Data were recorded over 28 days when the birds were 35 days of age. Significant differences ($P<0.05$) were recorded in FCR values between positive control and the treated groups. The clinical signs of disease were more pronounced in the positive control group which included ruffled feathers, anorexia and bloody tinged feces. Significantly high mortality was observed in the positive control group as compared to treated groups. Significantly higher ($P<0.05$) oocyst per gram of feces (OPG) values were recorded in the control group on 7th and 10th days post infection (dpi) when the birds were 23 and 26 days old respectively. Cecal lesion score was significantly high ($P< 0.05$) at 5th, 7th and 10th dpi in the positive control group when the birds were 21, 23 and 26 days of age respectively. The histopathological changes in cecal section were more severe and pronounced in the positive control group as compared to treated groups. These lesions were in the form of hemorrhages, leukocytic infiltration, degeneration and thickening of cecal wall. Very mild microscopic changes were observed in the cecal section of P. harmala treated groups. It is concluded from the findings that methanolic extract of P. harmala at the rate of 300 mgL-1 drinking water has significant anti-coccidial effects against E.tenella in broiler chicks.

Keywords: Peganum harmala, methanolic extract, coccidiosis, broiler chicks.

[O5-01]: 5 - Poultry Products and Food safety (ID: 10032)
[India]

Enhancement of eggshell strength in ageing chicken: Effect of Moulting

C. G. David (1), P. A. Heartwin (2), R.K. Gorti (3), K.P. Suresh (4), A Mech (5), R.U. Suganthi (6)
(1, 3, 5, 6) National institute of Animal Nutrition and Physiology, Bangalore, India; (2) National Dairy Research Institute (southern campus), Bangalore, India ; (4) National Institute of Veterinary Epidemiology and Informatics, Bangalore, India
Corresponding author: corbon@rediffmail.com

Egg shell quality has been an important consideration for better storage and marketability of chicken eggs around the globe. Moulting has been in vogue to enhance egg production in aged birds usually beyond 70 weeks of age. To elucidate the role of moulting in enhancing eggshell strength, layer hens were fed with a high zinc diet (ZnO @ 20000 mg/kg feed) for 10 days beginning at 70 week of age. Egg shell breaking strength and shell thickness were measured in eggs collected from 12 hens on 60th, 72nd, 90th and 110th weeks and compared with those collected from hens fed on rations without ZnO. Results indicated that moulting enhanced shell strength and shell thickness. We also tested the effect of moulting on the duodenal uptake of calcium and the carbonic acid activity along with the basal HCO3 ion transport across the eggshell gland to correlate with the deposition of calcium carbonate over the egg shell during the shell formation. Birds were sacrificed on day 5, 10 of moult, and on 90th and 110th weeks of age for this purpose. Moulting has enhanced the duodenal uptake of calcium, carbonic anhydrase activity and basal HCO_3 ion transport across the eggshell gland significantly. We conclude that the enhanced egg shell quality during post moult production period is due to the enhanced absorption of dietary calcium from the intestinal tract, basal HCO_3 ion transport across the eggshell gland epithelium permitting longer stay of the egg in the uterus and increased deposition of calcium carbonate over the shell due to enhanced carbonic anhydrase activity.

Keywords: Moult, Eggshell strength, ageing hen, ion-transport, calcium

[O5-02]: 5 - Poultry Products and Food safety (ID: 10083)

[Greece]

Fat and cholesterol content of meat from laying hens reared under the family production system

E. Kasapidou (1), P. Mitlianga (2), C. Papadaki (3), E. N. Sossidou (4)

(1, 2, 3) Department of Agricultural Technology, Division of Agricultural Products Quality Control, Technological Educational Institution of Western Macedonia, Florina, Greece; (4) Hellenic Agricultural Organization-DEMETER, Veterinary Research Institute, Thessaloniki, Greece

Corresponding author: sossidou.arig@nagref.gr

Family produced poultry meat constitutes a significant part of the total consumption of poultry meat in the rural areas of Greece (Kasapidou et al., 2014). Meat fat and cholesterol content are important parameters of meat nutritional quality due to the association between the dietary fat and cholesterol, and cardiovascular and other lifestyle diseases in humans. The objective of this preliminary study was to evaluate the fat and cholesterol content of hen meat, produced under the family production system, in relation to the recent dietary recommendations and reference values for healthy fat consumption. Carcasses from end-of-lay hens were collected from 7 family farms. Skinless breast (m. pectoralis superficialis) and thigh (m. biceps femoris) samples were prepared for the determination of fat and cholesterol content. Fat content was measured following the AOAC (2003) methodology and total cholesterol content was determined using a colorimetric method (Boehringer Mannheim kit 139050). The average fat content (g/100 g sample) was 0.8, 0.17 and 3.7, 1.65 in breast and thigh samples, respectively and it was similar to the values reported in the literature. The cholesterol content (mg/100g sample) was 92.5 and 40.31 in breast muscle and 126.5 and 40.64 thigh muscle and it was significantly higher (>50 mg/100 g sample) than the values reported in the literature. The contribution of a hen meat portion (100g raw product) to the reference fat intake (70 g/2000 kcal/day/adult; European Food Safety Authority, 2009) is very low ranging from 1.2% to 5.3% for breast and thigh muscle. According to the latest guidelines (USDA/HHS, 2010), cholesterol intake should not exceed 300 mg and therefore a hen meat portion would provide consumers with approximately 30.6% (breast) and 42.2% (thigh) to the maximum recommended cholesterol daily intake. The low fat content in relation to the high cholesterol content raise concerns about hen nutrition and particularly the quality and the type that is fed to the birds. Current evidence is insufficient and a greater number of samples as well as determination of the fatty acid composition is needed to provide a comprehensive picture of the nutritional quality of family produced poultry meat.

Keywords: family poultry, meat quality, laying hens, cholesterol, fat

[O5-03]: 5 - Poultry Products and Food safety (ID: 10059)

[Germany]

Functional meat quality and color of chicken thighs as influenced by genetic growth potential and age

P.C. Muth (1), A. Valle Zárate (2)

(1, 2) Institute of Animal Production in the Tropics and Subtropics, University of Hohenheim, Germany

Corresponding author: p_muth@uni-hohenheim.de

The effect of genetic growth potential on meat quality of breast fillets of chicken has been thoroughly investigated, but less attention has been placed on the thigh muscles of chicken. In the present investigation thigh cuts (n=264) of two slow growing meat-type chicken lines and a fast growing commercial broiler have been compared with regard to their functional meat quality (pH, water holding capacity and shear force) and color attributes of meat. To account for the effect of age and the different growth trajectory of genotypes, three slaughter ages were applied for the commercial birds (4, 7, and 10 weeks, respectively), whereas birds of the slow growing lines were slaughtered at two ages (7 and 10 weeks, respectively). The experimental design comprised each two temporal and spatial replicates. Variation in ultimate pH of thigh meat was low between genotypes. Cooking loss was significantly reduced in the slow growing chicken compared to the broilers slaughtered at 4 and 7 weeks of age, whereas expressible moisture did not differ between genotypes at equal age. Also shear force varied only slightly between genotypes, whereas within genotypes toughness of thigh meat significantly increased with age. Thighs of slow growing light-skinned birds was significantly darker and redder and more intensively colored on their lateral surface compared to commercial broilers at equal age, whereas rapidly growing birds slaughtered at an age of 4 weeks exhibited significantly redder thigh meat compared with slow growing light-skinned birds slaughtered at 10 weeks of age. This might be associated with heme pigment levels that were significantly lower for broilers than for the slow growing genotypes of equal age. There was no significant difference between broilers slaughtered at an age of 4 weeks and slow growing light-skinned chicken groups. In conclusion only few differences in functional thigh meat quality were revealed when comparing slow and fast growing chicken genotypes. We hypothesize that because leg weights and yields were not a primary target for selection of chicken during the last decades, correlated changes in meat properties remained moderate and resulted in only limited alterations of functional attributes.

Keywords: chicken, thigh, quality, growth, genotype

[O5-04]: 5 - Poultry Products and Food safety (ID: 10071)
[Lebanon]

Nutritional value, performance, and egg quality of laying hens fed diets containing industrial hemp (Cannabis sativa L.) seed

M.T. Farran (1), G.W. Barbour (2), N.K. Usayran (3)
(1) American University of Beirut, Lebanon; (2) Lebanese Agricultural Research Institute, Lebanon; (3) Lebanese University, Lebanon
Corresponding author: gbarbour@lari.gov.lb

Industrial hemp seeds of Anka, Codimono, Futura, Epsilon, and Monoica varieties were de-hulled and kernels were oil extruded. Chemical composition, apparent and true metabolizable energy (AME and TME) and those corrected for zero nitrogen balance (AMEn and TMEn), and amino acid digestibility of soybean meal (SBM) and hemp kernel meals were determined using the precision feeding method on 8 individually caged mature leghorn roosters per treatment with similar number of fasted birds to estimate endogenous and metabolic losses. Crude protein, methionine, and lysine concentrations (% as is) in the hemp kernel meals and SBM (in brackets) were 57.7 (47.2), 1.34 (0.71), and 2.15 (3.36), respectively. All hemp kernel meal varieties had AMEn and TMEn values higher ($P < 0.01$) than those of SBM but those of Codimono (3161 and 3530 kcal/kg, respectively) were higher ($P < 0.01$) than those of all other hemp varieties. The apparent methionine and arginine digestibility coefficients of all hemp kernel meals averaged 92.4 and 93.6%, respectively, and were higher ($P < 0.05$) than those of SBM (87.2 and 90.2%, respectively). Anka and Epsilon had apparent lysine digestibility lower ($P < 0.05$) than that of SBM (81.0 vs 86.6%) with intermediate values for Codimono, Futura and Monoica. Compared to SBM, true methionine digestibility in Codimono, Futura, and Epsilon was higher ($P < 0.05$) whereas, lysine digestibility was comparable. Isocaloric and isonitrogenous corn-SBM diets containing no hemp (control), hemp seed (13.5%), hemp seed meal (18.9%), and hemp kernel meal (22.4%) of the Codimono variety fed each to 6 individually caged laying hens for a 28 d laying period resulted in comparable performance in terms of egg production, feed conversion, egg mass and egg quality parameters. Moreover, egg yolk of hens fed the control and hemp containing diets had similar fat and cholesterol contents averaging 52.4% and 11.1 mg/g dry yolk. In conclusion, all the investigated hemp varieties, especially Codimono, are potential sources of energy and protein in poultry diets. Further nutritional investigations are needed to elucidate the effect of industrial hemp on broiler and laying hen performance and product quality.

Keywords: industrial hemp seed, metabolizable energy, amino acid digestibility, layer performance

[O6-01]: 6 - Poultry Housing and Management (ID: 10037)
[India]

Influence of age, strain fowl and system of rearing on brooders performance of Guinea fowl.

K. Premavalli (1), N.Ramamurthy (2), A.V.Omprakash (3), V. Balakrishnan (4), V. Appa Rao (5), R.Rajendran (6), G.Raj Manohar (7)
(1, 3) Poultry Research Station, TANUVAS, Tamil Nadu, INDIA; (2, 7) Dept of Poultry science, MVC, TANUVAS, Tamil Nadu, INDIA; (4) Dept of Animal nutrition, MVC, TANUVAS, Tamil Nadu, INDIA; (5) Dept of Meat Science and Technology, MVC, TANUVAS, Tamil Nadu, INDIA; (6) Professor, Directorate of Research, TANUVAS, Tamil Nadu, INDIA
Corresponding author: drpremavalli@gmail.com

A biological experiment was conducted to find out the influence of age, strain and system of management on brooder performance of Guinea fowl. A total of 320 one day old Guinea fowl keets of Pearl and White strains belonging to a single hatch were randomly divided into four treatment groups (T1, T2, T3 and T4) with four replicates of 20 chicks each under both cage and deep litter system of management. Standard nutritional and management conditions were followed throughout the experiment. The body weight, feed intake and livability were recorded biweekly from 0 day to 8 weeks of age. The results revealed that the age of the bird exerted significant ($p<0.01$) influence on mean body weight, feed efficiency and per cent livability of Guinea fowl keets. System of rearing had significant ($p<0.01$) influence only on body weight. The strain of the bird did not have any influence on all the parameters studied. As the age increased, mean biweekly body weight, feed efficiency and livability also showed significant ($p<0.01$) increase up to 8 weeks of age. Among management systems, mean body weight was significantly higher ($p<0.01$) in deep litter from the second week to the sixth week of age. However, neither the strain nor the system had any influence on mean feed efficiency and livability in Guinea fowls. Hence, it can be concluded that the Guinea fowl keets can be reared under both deep litter and cage system for good brooder performance.

Keywords: Guinea fowl, Brooder, Age, Strain, Systems

[O6-02]: 6 - Poultry Housing and Management (ID: 10085)
[Netherlands]

Recent advances in Poultry housing

A.J. Hulzebosch
CAH Dronten University of Applied Sciences, Netherlands
Corresponding author: jan.hulzebosch@salmet.de

Recent advances in Poultry housing on four main area's

1. Heat stress: Heat stress is still a big problem in Middle East in certain periods of the year. It results in big losses because of mortality and reduced production. New types of cages are available now to reduce the heat stress.
2. Hygiene and product safety: The egg cross conveyor can be a big transmitter of bacteria etc. A full automatic cleaning system for the egg cross conveyor that kills up to 99.9 % of bacteria by heat , disinfectant and ultrasonic waves is now available.
3. Environment, sustainability: Manure dryers and composters are not new. But the possibility to have a full inline system that transforms manure into perfect organic fertilizer pellets is now available.
4. Broilers: Broiler ages are winning more and more popularity in the Middle east region. Can they be a solution for the increasing demand for broiler meat?

Keywords: climate, hygiene, sustainability, product safety, broilers

[O6-03]: 6 - Poultry Housing and Management (ID: 10012)
[Portugal]

Influence of continuous and pinpoint temperature changes on chicken embryonic development

R. Noiva (1), A. Menezes (2), M. C. Peleteiro (3)
(1, 2, 3) Interdisciplinary Research Centre on Animal Health, Faculty of Veterinary Medicine, University of Lisbon (CIISA/FMV/ULisboa), Portugal
Corresponding author: rute.noiva@gmail.com

Chicken embryos are poikilothermic, relying on an external heat source to initiate and maintain normal metabolic functions. Consequently, it is important to incubate eggs at a temperature that optimizes hatchability, which is defined as 37,5 to 37,8°C. Problems associated with equipment maintenance and other conditions may cause embryos to overheat or cool down, thus negatively affecting hatchability and chick quality. One thousand five hundred eighty specific-pathogen-free eggs were divided into five different groups. The first group was defined as the control group (incubated at 37,8ºC and relative humidity 50-55% during the first 18 days and 60-65% during the last 3 days), and the remaining four batches challenged with: A) constant high temperature (38,9ºC); B) constant low temperature (36,7ºC); C) pinpoint (3 hour-long) rise in temperature (38,9ºC) during days 3 and 18 of incubation; D) pinpoint (3 hour-long) reduction of temperature (36,7ºC) during days 3 and 18 of incubation. Break-outs were performed every 24 hours to evaluate the effects of the different manipulations on embryonic development. Of all the parameters monitored, those that showed to be most affected by temperature challenges were: albumen/egg weight ratio; yolk/egg weight ratio; heart rate; voluntary movements per minute; mortality and malformation rates. The expected steady decrease in albumen and yolk weight was negatively influenced by all treatments. All treatments resulted in increased heart rate and a decrease in voluntary movement. Mortality was most prominent during the first 48 hours of incubation and at the “blood ring” stage, for embryos challenged with treatments A-C; treatment D embryos displayed higher mortality rates during the “blood ring” and “feathers” stages. Malformation rates were higher for embryos subjected to treatment A and mostly pertained to the abdominal wall, head/skull and limb. Compound malformations were common. Overall, continuously high or low incubation temperatures produced more prominent results than sudden rises or drops in temperature.

Keywords: chicken embryo, incubation, development, temperature

[O7-01]: 7 - Other / Miscellaneous (ID: 10046)

[Algeria]

The autochthonous Lactobacillus strains: Screening of potential probiotics for use in Algerian's poultry

T. Idoui (1), M. Sifour (2)

(1) Laboratory of Biotechnology, Environment and Health, Faculty of nature and life sciences,University of Jijel, Algeria; (2) Laboratory of Molecular Toxicology, Faculty of nature and life sciences,University of Jijel, Algeria

Corresponding author: tay_idoui@yahoo.fr

In poultry industry, antibiotics are used to prevent poultry pathogens and disease. However, the use of dietary antibiotics resulted in common problems such as development of drug-resistant bacteria and imbalance of normal microflora. It has become necessary to develop alternatives using beneficial bacteria that enhance microbial growth. As living microorganisms, probiotics can stimulate gut microflora, improving growth performances in animals and decreasing use of antibiotics. Isolated Lactobacillus originated from the poultry gastrointestinal tract of the ISA15 strain were characterized for their probiotic potential. In the preliminary investigations, the viability of the isolates strains under different environmental and stress conditions was evaluated. Solely two strains were selected for detailed tests and they appeared resistant to bile salt concentrations and acidic pH values. The selected strains were further characterized for their inhibitory activity against gram positive and gram-negative bacteria, aggregation, co-aggregation, cell surface hydrophobicity and adhesion to epithelial cells. The selected strains showed enhanced inhibitory activity and according to the results, one strain appeared to be a superior probiotic candidate compared to the second one. This potential probiotic candidate was identified by 16sRNA as Lactobacillus gasseri. The results of the in vivo study showed a significant positive effect ($p< 0.05$) of probiotic on body weight and feed conversion ratio of chickens ISA 15 strain

Keywords: Probiotic, Lactobacillus gasseri, Autochthonous, Poultry

[O7-02]: 7 - Other / Miscellaneous *(ID: 10006)*
[Pakistan]

Immunohistochemical Localization and Morphometrical Study of Somatotroph, Lactotroph and Gonadotrophs in Adenohypophysis of Zinc supplemented Spent Layers

M. Idris (1), Z. Ur-Rahman (2), T. Khaliq (3), F. Muhammad (4)
(1) The Islamia University of Bahawalpur, Pakisatan; (2, 3, 4) University of Agriculture, Faisalabad
Corresponding author: musadiq.idris@iub.edu.pk

The study was conducted to evaluate the effect of dietary zinc oxide (ZnO) supplementation on immune-histochemical (IHC) localization of somatotroph, lactotroph, LH-gonadotroph and FSH-gonadotrophs in adenohypophysis of spent layers. One hundred commercial White Leghorns (67 week old) were procured from market and brought to the experimental poultry farm at Department of Physiology and Pharmacology, University of Agriculture, Faisalabad, Pakistan. After acclimatization, birds were supplemented with ZnO 3gm /kg feed and the experiment was terminated after 21 days. The size and area of the ir-GH, ir-PRL, ir-LH and ir-FSH cell and nucleus; serum cortisol concentration was studied in the spent layers before and after zinc (Zn) supplementation. The cell and nucleus size and area of the lactotroph and serum cortisol concentration did increase significantly after Zn supplementation. The LH and FSH-gonadotropic cell size and area did decrease significantly in Zn supplemented spent layers as compared with the spent layers before supplementation. The supplementation of ZnO to spent layers has an increasing impact on cell size and area of the lactotroph which will be useful to enhance the production of spent layers, while decreased cell size and area of the LH and FSH- gonadotrophs can be well correlated with the influence of increased level of PRL after Zn supplementation.

Keywords: Spent layer; Somatotroph; Lactotroph; Gonadotroph; Supplementation

[O7-03]: 7 - Other / Miscellaneous (ID: 10036)
[Australia]

Processing and storage of ratite oils affects radical scavenging ability and primary oxidation

S. Mashtoub (1), D.C. Bennett (2), C. D. Tran (3), G. S. Howarth (4)
(1) School of Medicine and Pharmacology, Fremantle Hospital, The University of Western Australia, Fremantle, Western Australia; 2Gastroenterology Department, Women's and Children's Hospital, North Adelaide, South Australia; Avian Research Centre, Faculty of Land & Food Systems, University of British Co; (2) Avian Research Centre, Faculty of Land & Food Systems, University of British Columbia, Vancouver, Canada; (3) Gastroenterology Department, Women's and Children's Hospital, North Adelaide, South Australia; (4) School of Animal & Veterinary Sciences, The University of Adelaide, Roseworthy Campus, South Australia
Corresponding author: suzanne.mashtoub@gmail.com

Background. Oil-based treatments for cardiovascular and gastrointestinal disease seek to minimise oxidative damage using antioxidants. Oils derived from ratites (flightless birds) have therapeutic potential, since they predominantly comprise fatty acids (FA), varying in composition between species. Aim. We investigated the influence of rendering, storage time and storage procedures on radical scavenging activity (RSA) and primary oxidation status of oils derived from the emu, ostrich and rhea. Methods. Seven different Emu Oil batches (EO1-4, South Australia; EO5, Victoria, Australia; and EO6-7, British Columbia, Canada; varying in processing and storage factors), Ostrich Oil (OsO), Rhea Oil (RO) and Olive Oil (OlO) were tested for free RSA against 2,2-diphenyl-1-picryl hydracyl (1/IC50 g/ml) and primary oxidation (peroxide mEqO2/Kg). $p<0.001$ was considered statistically significant. Results. RSA (g/ml) of EO1 (558±22) was greater than EO2 (8±0.6), EO5 (413±26), EO6 (16±0.3), EO7 (2±0.2), OsO (313±12), RO (32±12) and OlO (196±4), but less than EO3 (717±32; $p<0.001$). RSA of OsO was greater than RO ($p<0.001$). Primary oxidation (mEqO2/Kg) of EO1 (97±0.6) was greater than EO2 (28±0.2), EO5 (11±0.6), OsO (50±0.9) and OlO (61±0.9). Conclusions. The wide variability in radical scavenging activity of oils highlights the need for standardisation of farm location, diet composition, rendering procedures, time of render and duration of storage. Regulatory control of these parameters is recommended in order to minimise differences in therapeutic efficacy of ratite oils.

Keywords: radical-scavenging activity; oxidation; ratite oils

[O7-05]: 7 - Other / Miscellaneous (ID: 10027)
[Algeria]

Morphohistological study of the spleen of broiler chickens during post-haching stress

T. khenenou (1), M. Melizi (2), H. Benzaoui (3)
(1) Laboratory of Sciences and Techniques of Life , Agroveterinary Institute ,taoura, Souk Ahres University Algeria; (2) Batna university, Algeria; (3) EPH NGAOUS,Algeria
Corresponding author: tarekkhenenou@yahoo.fr

The morpho-histological evolutions of spleen during 8 weeks of post-haching age, realized on 64 subjects of broiler chicken (Isa 15). The collected information about the post hatching morphometric and histology showed that the spleen average weight peeked at 6th week of age and remained stable until 8th weeks of post-hatching age. These histological variations are not in close relationship with the sexual maturity as it is in the case of the thymus and bursa of Fabricius, white pulp and red pulp are intermingled and there is no limit between two pulps. A sample of 20 chicks (Isa 15) had access to food for only 45 minutes a day for 9 days compared with those of a control group fed ad libitum and necropsied at 9 and 18 days of age (n=20). Restricted diet does not appear to cause changes in the morpho-histological aspect of the spleen. These results can be used in the diagnosis of viral disease such as the Gumboro and Marek diseases.

Keywords: Morphohistology, Spleen, Post-haching age stress, Broiler chicken

[O9-01]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10008)
[United Arab Emirates]

Avian Influenza in the Middle East

H. Bakri
Global expert MSD, UAE
Corresponding author: husam.bakri@merck.com

Avian influenza (AI) is a highly contagious disease caused by type A influenza viruses that are members of the family Orthomyxoviridae in the genus Influenza virus A. Middle East countries have an estimated poultry population of 3 billion broilers, 137 million commercial layers, 30 million breeders, 2 million layer breeders, 500.000 GP broilers and 180.000 GS layers. Since 1999 the region faces different health problems such as drop in egg production close to peak production: up to 62 % of the eggs during 2-3 weeks are thin – shelled, rough and misshapen, moderate mortality and respiratory signs in commercial Layer and Breeder were observed. Severe mortality (over 60% after 3 weeks of age), severe respiratory signs, high percentage of condemnation due to secondary bacterial infections were also noticed in broilers. Different serum and tissues samples were taken from breeders, layers and broilers from different countries and analyzed by serology and virus isolation. The results showed the presence of AI (H9N2) virus in the Middle East area combined with IB or ND. different methods of reduction in mortality and improvement in production as parameters were investigated. By using Nobilis Influenza H9N2, the farmers were able to control the economic impact of the infection.

Keywords: Avian influenza; Middle East; Nobilis Influenza H9N2

[O9-02]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10101)
[Lebanon]

Impact of passaging of H9N2-avian influenza virus in hamsters on its pathogenicity and genetic variability

H. Shaib (1), N. Cochet (2), T. Ribeiro (3), A. AbdelNour (4), G. Nemer (5), S. Harakeh (6), E. Barbour (7)
(1, 5, 7) American University of Beirut. Lebanon; (2) Université de Technologie de Compiègne; (3, 4) Institut Polytechnique-LaSalle Beauvais. France; (6) King Abdulaziz University. Saudi Arabia Kingdom
Corresponding author: hs45@aub.edu.lb

This study demonstrates the impact of nasal viral passaging of avian-H9N2 in hamsters on its cross species-pathogenic adaptability, and variability of amino acid sequences of the hemagglutinin (HA) and neuraminidase (NA) stalk. Three intranasal passaging of avian H9N2 in hamsters were accomplished namely P1, P2, and P3. The morbidity signs were indicative of the low pathogenicity of the differently-passaged H9N2 in hamsters. The frequency of gross and microscopic lesions were insignificantly different among hamsters challenged with the differently passaged H9N2 ($P>0.05$). The HA test revealed a presumptive detection of the hemagglutinating H9N2 viruses in 10/10, 0/10 and 5/10 of the tracheas of hamsters that were challenged with P1, P2, and P3 viruses, respectively. However, the multiply passaged viruses showed a clear pathogenic adaptability to the lung tissue, with a presumptive detection of hemagglutinating viruses in 10/10, 4/10, and 9/10 of the lungs of hamsters challenged respectively with P1, P2, and P3 viruses. Application of different primers for amplification of HA1 region proved the presence of mixed H9N2 populations within the different parts of the respiratory tissues of P1-challenged hamsters. There was a 100% similarity in the amino acid sequence of the HA gene of most passaged viruses. The amino acid sequence of the neuraminidase in the 3rd passaged H9N2 recovered of lungs showed a mutation that might have a role in the pathogenic adaptability of P3 viruses in hamsters lungs namely, the substitution of Arginine in position 46 of the original virus by a Proline. The apparent adaptation of avian H9N2 virus to mammalian cells is in agreement with the World Health Organization alertness for a possible public health threat by this adaptable virus.

Keywords: avian influenza-H9N2 virus; passages; pathogenic adaptability; lesions; amino acid sequence; hemagglutinin (HA); neuraminidase (NA) stalk; mutation; hamsters.

[O9-03]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10100)
[Lebanon]

Histopathology of the respiratory system in essential oil-treated broilers following a challenge With Mycoplasma gallisepticum and/or H9N2 influenza virus

E. Barbour (1), R. El-Hakim (2), M. Kaadi (3), H. Shaib (4), D. Gerges (5), P. Nehme (6)
(1, 2, 3, 4, 5, 6) American University of Beirut, Lebanon
Corresponding author: eb01@aub.edu.lb

The objective of this work is to evaluate the impact of eucalyptus and peppermint essential oils (EO) in the protection of the respiratory system of broilers against controlled challenges by Mycoplasma gallisepticum (MG) and/or avian influenza virus H9N2. Seventy 1-day-old broilers were reared in 7 groups (10 birds/group) up to 1 week of age. Group 1 was the control (non-treated with EO and unchallenged); challenged groups were Group 2 (non-treated with EO and MG challenged), Group 3 (EO treated and MG challenged), Group 4 (non-treated with EO and H9N2 challenged), Group 5 (EO treated and H9N2 challenged), Group 6 (non-treated with EO and MG/H9N2 challenged), and Group 7 (EO treated and MG/H9N2 challenged). At 1 week of age, an intratracheal challenge of the birds with MG (2 hemagglutination units/0.5 mL/bird) and/or H9N2 (2 hemagglutination units/0.5 mL/bird) was given to specific groups mentioned previously. Essential oils were administered for 6 days, effective 1 day post-challenge. Histopathological observations were concluded at 6 days post-challenge and revealed a significant reduction ($P < 0.05$) in microscopic tissue lesions of birds treated with EO in comparison to birds deprived from this treatment but challenged similarly. The significant ($P < 0.05$) reduction in microscopic lesions included a decrease in tracheal deciliation in MG- and MG/H9N2-challenged birds, a decrease in mucosal hypertrophy in MG-, H9N2-, and MG/H9N2-challenged birds, a decrease in goblet cell degeneration in MG and MG/H9N2-challenged birds, a decrease in mucus accumulation in MG-challenged birds, and a decrease in heterophil infiltration in MG/H9N2-challenged birds.

Keywords: Avian influenza virus (H9N2), broilers, essential oils (EO), histopathology, Mycoplasma gallisepticum, respiratory system

[O9-04]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10024)
[Hungary]

Effect of quaternary benzo[c]phenantridine and protopine alkaloids (QBA-PA) on Salmonella enteritidis isolation and intestinal inflammation in experimentally infected broilers

A. Vucskits (1), P. Gaubinger (2), G. Hussami (3), E. Santin (4)
(1) Eastern European Area Manager, Manager of Technical Sales; (2, 3) Phytobiotics Futterzusatzstoffe GmbH; (4) Laboratory of Microbiology and Ornitopathology
Corresponding author: a.vucskits@phytobiotics.com

Plants that contain quaternary benzo[c]phenantridineand protopinealkaloids (QBA-PA) have been used as anti-inflammatory medication for a long time in traditional medicine. QBA-PA containing feed additives has been used in animal nutrition for more than 10 years with beneficial effects on the economy of animal production. It can be hypothesized that the anti-inflammatory property of QBA-PA contributes to the advantageous results. In order to prove the described hypothesis an experiment was carried out to investigate the effect of QBA-PA on selected parameters of broilers. Hundred and twenty Cobb broilers between one and twenty-one days of age were used in the experiment. A completely randomized experimental design was applied, with two treatments of four replicates of 15 birds each. (Treated +Infected and non- infected non treated control). Diets were formulated based on NRC guidelines. At day 14 the birds of the experimental group were orally infected with 105CFU in 1mL of the Salmonella enteritidis. At day 15 birds received soluble QBA-PA preparation (1 g/1000 L). The treatment of Salmonella enteritidis challenged broilers with QBA-PA via drinking water significantly ($p<0.05$) reduced Salmonella enteritidis isolation in the caecum 7 days post inoculation compared to the control group. Broilers treated with QBA-PA alkaloids via drinking water presented significantly ($p<0,05$) lower expression of goblet and CD3+ cells in the duodenum and jejunum, and higher expression of cells positive for the markers CD4, CD8α, CD8αbright, CD8αdim, CD8β, TCR Vβ1, and CD28 in the blood as compared to the non-treated birds.

Keywords: QBA-PA, Salmonella enteritidis, intestinal inflammation, gut health

[O9-05]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10066)
[Pakistan]

Immunomodulatory activities of Genistein and Hesperidin in lipopolysaccharide-induced broilers.

A. A. Kamboh (1), W. Zhu (2)
(1) Department of Veterinary Microbiology, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University, 70060 Tandojam, Pakistan; (2) College of Animal Science and Technology, Nanjing Agricultural University, Nanjing 210095, China
Corresponding author: drasgharkamboh@yahoo.com

This study investigated the individual and combined effects of two flavonoids i.e., genistein and hesperidin for immune-modulatory effects in lipopolysaccharide (LPS)-induced broilers. Seven hundred twenty 1-d old broiler chicks were randomly divided into 6 treatment groups. The experimental diets were supplemented with no additives, 5 mg genistein/kg, 20 mg hesperidin/kg, or a one part genistein to four parts hesperidin mixture at 5, 10, and 20 mg/kg. On day 16, 18 and 20, half the birds from each group were separated and injected intra-peritoneally with Escherichia coli LPS to induce the immunological stimulation. Blood and immune organs were collected at 21 and 42 d for analysis. The results showed that both compounds modify the immunity through altering ($P < 0.05$) the immune organ indices such as spleen, thymus, and bursa towards the positive direction. Dietary supplements also changed the cellular and humoral immunity by increasing the T lymphocyte transformation rate ($P<0.01$), phagocytic activity ($P<0.01$) and anti NDV (Newcastle disease virus) and AIV (Avian influenza virus) antibody titers ($P<0.05$). In general, genistein and hesperidin exerted the immune-modulatory effects in dose-dependent manner. These findings indicated the potential of genistein and hesperidin for immune-stimulation in LPS-challenged broilers.

Keywords: Lipopolysaccharide, Genistein, Hesperidin, Broiler, Immunity

[O9-06]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10087)
[Lebanon]

Koch's Postulate in Reproduction of Broiler Coccidiosis by Co-infection with Eight Most Common Eimeria spp.: a Model for Future Evaluation of New Biologics

E. Barbour (1), D. Ayyash (2), H. Shaib (3), R. Bragg (4), E. Azhar (5), S. Harakeh (6), T. Kumosani (7)
(1) American University of Beirut, lebanon; (2, 3) American University of Beirut, Lebanon; (4) University of the Free State, Nelson Mandela Drive, Bloemfontein; (5) Kind Abdulaziz University ; (6, 7) King Abdulaziz University
Corresponding author: danielleayyash@hotmail.com

The purpose of this research is to establish a model of Koch's postulate for reproducing coccidiosis in broilers by co-infection with eight most common Eimeria spp. involved in this economic disease, in an attempt to use this model in future evaluation of new controlling biologics. Four groups of broilers each challenged at a different age (14, 21, 28, and 35 d) with an equivalent number of sporulated oocysts of eight Eimeria spp. had a reduction in their mean weight gain of 10.2% compared to the four parallel control groups of birds that were deprived of the challenge. The mean feed to live body weight conversion ratio increased significantly from 1.5 in the four unchallenged-control groups to 3.1 in the four challenged groups ($P<0.05$). The mean frequency of mortality increased up to 15% in the challenged groups in comparison to 5% in the controls. This higher mortality was associated in most challenged groups with significant increase in the mean lesion scores and mean oocyst count in the intestine compared to those observed in the controls. The benefit of using Koch's postulate for reproducing coccidiosis in broilers in searching for new biologics will be presented.

Keywords: Eimeria spp.; Koch's postulate; oocyst count; lesions; performance

POSTERS SESSION

[P01]: 3 - Alternative Feed Sources for the Med. Region (ID: 10004)
[Iraq]

Effect of dietary supplementation with different oils on egg quality of Japanese quail (Coturnix coturnix japonica)

H.J. Al – Daraji
Department of Animal Resources, College of Agriculture, University of Baghdad, Baghdad, Iraq
Corresponding author: prof.hazimaldaraji@yahoo.com

This experiment was performed to investigate the influence of different oils in the diets of laying quail on their egg quality characteristics. One hundred and twenty 7-wk old Japanese quails (Coturnix coturnix japonica) were allocated to four groups with three replicates containing 10 quail each (30 quail per each treatment group). They were fed for 13 weeks (including one week of adaptation period) on diets containing 3% oil from different sources, viz. either sunflower (T1), linseed (T2), maize (T3), or fish oil (T4). Egg quality criteria (egg weight, yolk weight, albumen weight, shell weight, yolk diameter, yolk height, albumen diameter, albumen height, relative weight of yolk, relative weight of albumen, relative weight of shell, shell thickness, Haugh unit, yolk index, and albumen index) were measured at 9th, 11th, 13th, 15th, 17th, and 19th week of bird age, using 25 eggs from each experiment group. Dietary inclusion of either maize (T3) or fish (T4) oil in laying quail rations resulted in significant ($p < 0.05$) increase with respect to egg weight, yolk weight, albumen weight, yolk diameter, yolk height, albumen diameter, albumen height, shell thickness and Haugh unit during all periods of experiment and in total means of these parameters as compared with other treatments (T1 and T2). However, the addition of different oil sources used in this experiment to quail diets did not significantly ($p > 0.05$) affect total means of shell weight, relative weight of albumen and relative weight of shell, while total means of relative weight of yolk, yolk index, and albumen index were higher ($p < 0.05$) in the birds receiving diets containing fish (T4) or maize (T3) oil than in other treatments (T1 and T2). The results of this experiment clearly demonstrated that supplementing the laying quail diet with fish or maize oil improved most criteria of egg quality. Therefore, incorporation of fish or maize oil into the diets of Japanese quail may have practical value in manipulating egg quality.

Keywords: oil sources, Japanese quail, egg quality

[P02]: 3 - Alternative Feed Sources for the Med. Region (ID: 10048)
[Algeria]

Effects of the Marl and Kaolin on the Growth performance, the digestive efficiency and the moisture droppings of broiler chickens

A. Meredef (1), A. Kalli (2), N. Kaboul (3), A. Mehdaoui (4), Z. Ahmed Gaid (5)
(1, 2, 3, 4, 5) Laboratory of food sciences. Institute of veterinary and agronomic sciences, University of Batna 05000 Algeria
Corresponding author: oduniv@yahoo.fr

Two types of clay (Kaolin and Marl) were incorporated in a proportion of 3 percent in the diet of broilers in order to assess their effects on the growth performance, the digestive balance and the moisture droppings during a rearing cycle of 56 days. Two hundred forty day-old chicks, ISA 15 strain were assigned to three groups of 80 subjects each and 4 replicates per treatment (control group without clay, 3% kaolin group and 3% marl group). At start up, it was found that the marl significantly increases the weight gain (8.9% ; P = 0.04) and improves the feed conversion ratio (-15% ; P = 0.01). At the end of rearing, both clay types have promoted a significant increase of weight gain (P = 0.01) and have improved the feed conversion ratio of nearly 10% (P = 0.03). The results of the digestive balance showed that marl significantly increases protein digestibility (10% ; P = 0.02) and lipids (+8.8% ; P = 0.03) at start up. During finishing, marl promotes protein digestibility (+8.3%; P = 0.02) and promotes drier droppings (24.2% vs 20.15% dry matter; P = 0.04).

Keywords: Marl, Kaolin, Growth performance, Digestive efficiency, Broiler

[P03]: 3 - Alternative Feed Sources for the Med. Region (ID: 10072)
[Egypt]

A new approach of zinc supplementation in broilers diet and its effect on performance and lipid metabolism under summer season conditions

A. M. Refaie (1), W. H. Eisa (2)
(1) Animal Production Research Institute, ARC, Dokki, Giza, 12618, Egypt; (2) National Research Center, Dokki, Giza, Egypt
Corresponding author: amira_refaie2@yahoo.com

This study aimed to improve the performance , lipid metabolism and antioxidant status of broiler chicks by adding two levels and two zinc sources (100/200 mg zinc sulphate and 40/80 mg zinc oxide nanoparticles/kg diet) to diets containing either soybean oil or palm oil in 2*2*2 factorial treatment arrangement. A total of 320 straight run day old Cobb 500 broiler chicks were divided equally into 8 treatments of 40 chicks each with four replicates per treatment and 10 birds per pen. Birds were offered the experimental diets from 1-35 days of age under hot climate Egyptian summer conditions (range of ambient temperature and relative humidity was 32-33.5 OC and 55-59%, respectively); Temperature Humidity Index (THI) ranged between 29.7 – 30.95 indicating that broilers were exposed to severe heat stress. The results are summarized as follows: 1-Compared to the zinc sulphate diet, chicks fed diets supplemented with zinc oxide nanoparticles recorded significantly better feed conversion ratio during starter, grower and overall periods in addition to higher (P=0.0001) lipase and superoxide dismutase (SOD) activity. 2- The lower level of dietary zinc irrespective of the source, resulted in higher feed intake during starter and overall periods but had no effect on lipase activity. 3- Oil source had no effect on feed conversion values and lipase activity throughout the experimental period. Soybean oil, however, resulted in significantly higher SOD activity. 4- Chicks fed diets containing soybean oil and supplemented with 80 mg Zn/kg diet as zinc oxide nanoparticles had reduced feed intake and the lowest feed conversion ratio (P<0.05) during starter and overall periods. In addition, there was an improvement in their lipase and SOD activity along with the economic efficiency. In conclusion, adding zinc oxide nanoparticles to broiler diets is more effective than zinc sulphate and supplementing it at level of 80 mg Zn/kg diet can diminish the adverse effect of hot weather conditions and improve the activity of lipase, SOD enzymes and economic efficiency.

Keywords: broiler performance, zinc sulphate, zinc oxide nanoparticles, lipid metabolism, summer season

[P04]: 3 - Alternative Feed Sources for the Med. Region (ID: 10084)
[Greece]

Faba bean seeds ileal digestibility of energy, crude protein and aminoacids in broiler chickens

V. Dotas (1), D. Gourdouvelis (2), E. N. Sossidou (3), S. Kianas (4), L. Hatzizisis (5), D. Dotas (6)
(1, 2, 4, 6) Faculty of Agriculture, Aristotle University of Thessaloniki, Greece; (3) Hellenic Agricultural Organization-DEMETER, Veterinary Research Institute, Thessaloniki, Greece; (5) Technological Educational Institute of Epirus, Arta branch, Greece
Corresponding author: sossidou.arig@nagref.gr

The aim of this study was the determination of crude protein (CP), amino acid (AA) and gross energy (GE) ileal digestibility of a local cultivar of fava bean (FB) seeds in broiler chickens. Three experimental diets were used; a basal diet and two others including FB seeds of the Greek cultivar "Polykarpi" at inclusion levels of either 150 or 300 g/kg, substituting equal amounts of maize starch. Hence, the differences in dietary CP and AA concentrations resulted only from the inclusion of FB seeds. Chromium trioxide (Cr2O3) was included as an indigestible marker in this ileal digestibility experiment. Crude protein concentration in the complete diets ranged from 163 to 243 g/kg. All diets were fed ad libitum to broilers chickens between the age of 15 and 22 days. Six pens of 12 chickens each were randomly allocated into each treatment. Digesta were collected from birds of each pen from the section of the gastrointestinal tract between Meckel's diverticulum and 2 cm anterior to the ileo-caeco-colonic junction. Crude protein ileal digestibility of diets showed a linear reduction by increasing inclusion rates of FB seeds. A similar trend appeared for the major part of AA. The AA of FB seeds with the highest value of ileal digestibility were, in decreasing order, arginine, glutamic acid, lysine, phenylalanine, leucine, whereas those with the lowest values were methionine, cystine and valine. Ileal GE digestibility of FB seeds at the lower inclusion rate (150g/kg) was comparable to that of the basal diet. On the contrary, diet containing 300 g/kg of FB seeds had significantly ($P \leq 0.05$) lower ileal digestibility than the other two treatments. The estimated mean value for ileal digestible energy of FB seeds was 11,4MJ/kg. The multiple linear regression approach applied in this experiment was suitable to determine partial digestibilities in AA of FB seeds with no need to consider basal endogenous AA losses.

Keywords: : fava bean seeds "Polykarpi", broiler chickens, ileal digestibility, crude protein, aminoacids

[P05]: 3 - Alternative Feed Sources for the Med. Region (ID: 10029)
[Egypt]

Effect of some feed supplements, individuals or in combinations on performance of broiler chicks during summer season

H. A.El Shanti (1), A. Z. Soliman (2), A. M. Abdel-Khalek (3), R. A. Bashir (4)
(1, 4) Dept Animal and Poultry Production, Fac. Agriculture, AL-Azhar Univ., Gaza, Palestine; (2) Department of Animal Production, Faculty of Agriculture, Cairo University, Egypt; (3) Dept. Poultry Nutrition Res., Animal Production Research Institute, ARC, Egypt
Corresponding author: aabdelkhalek_apri@yahoo.com

Four hundred day-old straight run Cobb chicks were randomly distributed among 40 groups of 10 birds each and received 10 different rations with 4 replicates per treatment for a period of 6 weeks during hot summer season. The treatments were: T1, wheat-corn-soybean meal diet (control), and control diet supplemented with: 200mg ascorbic acid/kg diet (T2); 50mg vitamin E/kg diet (T3); 0.1g Econase XT/kg diet (T4); 10g rosemary powder/kg diet (T5); 10g peppermint powder/kg diet (T6); 200mg ascorbic acid + 50mg vitamin E/kg diet (T7); 200mg ascorbic acid+ 50mg supplemental vitamin E + 0.1g Econase XT/kg diet (T8); 200mg ascorbic acid+ 50 mg vitamin E + 0.1g Econase XT +10g rosemary/kg diet (T9); and 200mg ascorbic acid+ 50mg vitamin E + 0.1g Econase XT +10g rosemary +10g peppermint/kg diet (T10). At 6 weeks of age, all treatments except for T3 and T5 (vitamin E and rosemary, respectively) resulted in average live body weight higher ($P \leq 0.05$) than that of the control birds. In addition, all supplements gave similar or increased feed intake as compared to the control except for T10 which resulted in lower ($P \leq 0.05$) feed consumption. Cumulative feed conversion values of all treatments were comparable to that of the control except for T5, T8, T9, and T10 which had significantly ($P \leq 0.05$) better values. Compared to the control, the dietary supplements investigated had no effects on carcass traits and blood constituents and all improved European Production Efficiency Index. In conclusion, the addition of most studied supplements is promising during hot summer months to get best growth broiler performance and net revenue.

Keywords: broiler chicks, summer season, anti-oxidants, medicinal plants, erformance

[P06]: 3 - Alternative Feed Sources for the Med. Region (ID: 10007)
[Egypt]

The influence of Moringa Peregrine Leaves as Additive Supplement on Growth Performance and Carcass Trait in Rabbit Diets.

S.E.M. El-Sheikh
Department of Animal and Poultry Nutrition, Desert Research Center, Egypt
Corresponding author: saidelsheikh@yahoo.com

A total of 36 crossbreed (New Zealand White * California) rabbits weaned at five weeks of age were used to study the influence of Moringa peregrine leaves as additive supplement on growth performance and carcass trait in rabbit diets. Rabbits were divided into three treatment groups. Each group contains four replica with three rabbits each. The experimental period extended from 5 to 13 weeks. The growing rabbits were fed three test diet series (0.00, 1.00 and 3 % Moringa meal diet). The experimental diets were formulated to be iso-nitrogenous (16.00 % CP) and iso-caloric (2500 kcal DE/ kg diet). The gross energy content of the Moringa peregrine leaves meal (MPLM) contained 3524 kcal/kg DM. The highest ($P<0.01$) final live body weight and total body weight gain values were recorded with rabbits fed diet containing 3% MPLM (2233.00g and 1599.3g) followed by those fed diet containing 3% MPLM (1201.0g and 1494.3g), respectively compared with rabbits fed control diet (1989.0g and 1379.0g). Feed intake was not significantly affected by MPLM supplementation. Rabbit fed diet contained 3% MPLM recorded the best significant ($P<0.05$) feed conversion value (3.25 g feed/g gain) compared to the other experimental groups. Rabbits fed diet containing 1 or 3 % MPLM showed the highest ($P<0.05$) empty carcass weight (1257.0 and 1290.7g), respectively compared to rabbits fed control diet (1159.7). Moreover, Rabbit fed diet containing 3% MPLM recorded the highest significant ($P<0.05$) abdominal fat value (1.12 %) compared to the other experimental groups. The best economical and relative economical efficiency values had been recorded for rabbit fed diet containing 3 % MPLM (2.6 and 128%), followed by rabbit fed diet containing 1% (2.4 and 117%), respectively compared with rabbits fed control diet (2.0 and 100%). It could be concluded that 3% Moringa peregrine leaves meal can be used as additive supplement without adverse effect on growth performance and carcass trait in rabbit diets.

Keywords: Moringa, growth, performance, rabbit, carcass

[P07]: 3 - Alternative Feed Sources for the Med. Region (ID: 10026)
[Turkey]

The effects of different molting methods and supplementation of grape pomace to the diet of molted hens on performance, egg quality and peroxidation of egg lipids

K. Kara (1), B. K. Güçlü (2)
(1, 2) Department of Animal Nutrition and Nutritional Dies. Faculty of Veterinary Med., Erciyes University, Kayseri, Turkey
Corresponding author: karakanber@hotmail.com

The objective of this study was to determine the effects of California molting method (control) or feeding 100% alfalfa meal (Y100), or 80% alfalfa meal + 20% layer diet (Y80), or 100% grape pomace (ÜP100), or 80% grape pomace + 20% layer diet (GP80) mixtures as 4 trial groups, in hens (Bovans, n=300, 72 weeks old), and feeding 2% grape pomace supplementation (ÜP) with layer diet after molting through second production cycle in hens (Bovans, n=200, 76 weeks old), on post molting performance, egg quality, and peroxidation of egg lipids. In 10 days after molting, there were no differences in body weight losses ($P>0.05$) among control, Y100, Y80, and ÜP100 groups, but hens in ÜP80 group had lower body weight losses ($P<0.05$). There were no differences in reaching the end of egg production cycles among groups ($P>0.05$). Supplementing grape pomace during to the diet of hens after molting did not influence ($P>0.05$) the start of egg production, 25%, 50% production, peek, and average egg production, egg weights, feed efficiency, and egg quality parameters (egg shell thickness, shell weight, shell weight ratio, albumen index, and egg specific gravity). Hens in Y100 group consumed more feed after molting compared to hens in the control group ($P<0.05$). The malondialdehyde (MDA) concentrations in fresh eggs in Y80 group was 60 ($P<0.01$) and 90 ($P<0.05$) minutes incubations, and in eggs in ÜP80 group at 60 ($P<0.05$) minutes incubations, as well as in eggs from ÜP group at 0 ($P<0.05$), 30 ($P<0.01$), and 60 ($P<0.05$) minutes incubations decreased significantly. However, the MDA concentration of eggs stored for 15 and 30 days at +4 ˚C was not effected by molting methods and 2% grape pomace supplementation to diet. In conclusion, California molting method or alternatively feeding 100% alfalfa meal, or 80% alfalfa meal + 20% layer diet, or 100% grape pomace, or 80% grape pomace + 20% layer diet mixtures offered successful molting practices, and feeding 2% grape pomace supplementation with regular layer diet after molting through the second production cycle affected the egg lipid peroxidation without any negative effects on the performance of the hens and egg quality.

Keywords: alfalfa meal, egg lipid peroxidation, egg quality, grape pomace, molting, performance

[P08]: 3 - Alternative Feed Sources for the Med. Region (ID: 10018)
[Iran (Islamic Republic of)]

Effects of different dietary levels of L-Carnitine on carcass characteristics and serum parameters in starter broiler chickens

J.Nasr (1), A.R. Gharegozlo (2), F. Kheiri (3)
(1) Department of Animal Science,Saveh Branch,Islamic Azad University, Iran; (2) Department of Animal Science,Saveh Branch,Islamic Azad University , Iran; (3) 1Department of Animal Science, Shahrekord Branch,Islamic Azad University, Iran
Corresponding author: javadnasr@iau-saveh.ac.ir

This study was conducted to investigate the effects of various levels of dietary inclusion of L-Carnitine on carcass yield and some serum parameters in starter broiler chickens, from one to ten days of age. A total of 240 one-day-old female broiler chickens (Ross 308) were randomly allocated into 4 experimental dietary treatment and one control group (3 replicates with 20 birds in each) using a completely randomized design. Treatments included the dietary supplementation of various levels (100, 200, and 300 mg/kg) of L-Carnitine for ten days post hatching time. The results showed that the dietary inclusion of 300 mg/kg L-Carnitine decreased live body weight, carcass, thigh, and intestine weights ($P<0.05$). However, all dietary treatments decreased breast weight compared to control diet ($P<0.05$). In addition, no significant differences were observed in percentage of carcass characteristics and relative organ weights (carcass, breast, thigh, liver, intestine, gizzard, proventriculus and heart) with or without L-Carnitine supplementation. The lowest serum triglyceride concentration was observed by the inclusion of 200 and 300 mg/kgL-Carnitine in diets ($P<0.05$). With increasing levels of L-Carnitine in diets the aspartate aminotransferase (AST) and alanine aminotransferase (ALT) activities were significantly increased ($P<0.05$). In conclusion, the addition of L-Carnitine in diets had no positive effects on carcass traits while it modified serum lipid parameter concentrations. Based on the negative influence of significant increases in ALT and AST activities on proper liver function, the dietary supplementation of L-Carnitine is not recommended in starter female broiler chickens.

Keywords: Broiler, Carcass, L-Carnitine, Serum

[P09]: 3 - Alternative Feed Sources for the Med. Region (ID: 10047)
[Algeria]

Effect of the hot conditions and nature of food on water consumption of the rooster

N. Allouche (1), Z. Dorbane (2), S. Kazi Aoual (3), D. Boudouma (4)
(1, 3, 4) Ecole Normale Supérieure d'Agronomie. (ENSA) d'El-Harrach, Alger.Algérie.Département de production animale, Algeria; (2) Ecole Nationale Supérieure Vétérinaire, Alger, Algeria
Corresponding author: nadjiaallouche@hotmail.com

Water consumption, accounting for the sources of the 73% of water of the body composition in the birds, is the most instinctive means and sourest to fight against heat. The aim of this assay is to measure the effect of the hot environmental conditions (temperature and moisture) on water consumption in roosters fed corn or soybean meal. Forty roosters (2 years old) of similar average weight (1970 ± 109 g) were each placed in individual cages and divided into two groups of 20 roosters each. The first one was submitted to a high temperature of 33.50±0.60°C and 62.95±2.75 % relative humidity, and the second to an optimal temperature of 22.63 ± 0.47°C and 68.03±4.78% relative humidity. In each group, 10 birds were fed for 6 days, with either corn or with soybean meal. During this period, distribution of water and food was done on a daily basis and at the same time and daily feed and water consumption were recorded. The comparison between the results was carried out with an analysis of variance technique. High ambient temperature resulted in a significant increase ($P<0.05$) in water consumption in corn- and soybean meal -fed roosters. Under both conditions of temperature, water/food ratios were higher ($P<0.05$) among roosters fed with soybean meal compared to those fed corn. These results indicate that we must not neglect the interaction effect between environmental temperature and the type of the feed ingredient used in poultry rations especially if the latter exacerbates heat stress and causes fatal losses.

Keywords: corn, roosters, soybean meal, temperature, water consumption

[P10]: 3 - Alternative Feed Sources for the Med. Region (ID: 10057)

[Algeria]

Protein digestibility of soybean meal in heat-stressed rooster

Z. Dorbane (1), N. Allouche (2), H. Boudjelaba (3), S. Kazi-Aouel (4), D. Boudouma (5)

(1) National Veterinary School, ENSV (École Nationale vétérinaire), Algiers, Algeria.; (2, 3, 4, 5) Department of animal production, ENSA (Ecole Nationale Supérieure Agronomique), Algiers, Algeria.

Corresponding author: zahiadorbane@hotmail.fr

Summer temperatures in the Mediterranean countries, including Algeria, impose severe stress on the broiler and lead to reduced performance. Poor growth performance is often correlated with low nutrient digestibility and metabolic utilization. The objective of this study was to measure the effect of high temperature on the apparent and true digestibility of soybean meal protein. The assay was conducted on two years old roosters of the local population, kept in individual metabolic cages. Two groups were formed: the first consists of 11 roosters kept at 22.69 ± 0.39°C and 67.03 ± 0.34 % relative humidity and the second group (9 birds) raised under an ambient temperature of 30.71 ± 0.27°C and a 56.20 ± 5.68% relative humidity. Following an adaptation period of 3 days, birds were fasted for 24 hours then fed for 3 days with the experimental diet. All birds were then fasted again for 1 day to allow total excreta collection. Water and soybean meal (42% CP) were offered ad libitum throughout the adaptation and assay periods. Ambient temperature significantly ($P<0.05$) affected the apparent digestibility value of soybean protein: 92.20% (at 22.69°C) versus 90.66% (at 30.71°C) as well as the true digestibility values: 92.67% (at 22.69°C) versus 91.08 (at 30.71°C). The data obtained show that under high ambient temperature, digestive utilization of soybean meal protein was reduced dictating a fine-tuning in poultry ration formulation. Adjusting ration formulation based on environmental temperature would also reduce the cost of feed and minimize excess nitrogen effluent in poultry manure during summer season.

Keywords: Digestibility, protein, rooster, soybean meal, temperature.

[P11]: 3 - Alternative Feed Sources for the Med. Region (ID: 10076)
[Egypt]

Response of laying hens to different dietary distillers corn dried grains with solubles levels

S. M. Shalash (1), S. Abou El-Wafa (2), M. Shabaan (3), H. El-Gabry (4)
(1, 2, 3, 4) Department of Poultry Nutrition, Animal Production Research Institute, ARC, Egypt
Corresponding author: mshabaanapri@yahoo.com

The current study was carried out to evaluate the effects different dietary levels (0, 5, 10, 15 or 20%) of dried distillers grains with solubles (DDGS) in laying hen diets. A total number of 150 Inshas as a local Egyptian laying hen strain (30wks old) were distributed into 5 treatments of 30 hens in three replicates A total of 150 hens and 15 cockerels (30 weeks old). Diets were formulated to contain 16% CP and 2700 kcal ME/kg during an experimental period of 30 to 42wks of age. Results showed that no significant differences ($P > 0.05$) in body weight , body weight gain, feed intake, digestibility of nutrients, egg quality (egg weight, albumin weight%, yolk weight %, shell weight%, yolk index%, egg shape % and shell thickness), semen quality (semen, motility%, life sperm%, dead sperm%, and abnormality sperm%) and fertility and hatchability (fertility %, total egg set %, fertile egg %, and body weight of chicks at hatch) for laying hens fed different dietary levels of DDGS (0,5,10,15 and 20%) at 42wks of age. However, increasing DDGS to 20% in laying hen diets significantly ($P \leq 0.01$) decreased egg production%, egg number, egg weight and egg mass, and gave the worst feed conversion and increased yolk color compared with the other levels (0,5,10 and 15%). Including DDGS in laying hen's diets improved (economical efficiency) EE and relative economical efficiency (REE) compared to the control diet. However, using 15% DDGS level recorded the best EE and REE compared to the other treatments. In conclusion, DDGS can be successfully fed at levels up to 15% in laying hen diets.

Keywords: Hens, DDGS, Egg production, Egg quality.

[P12]: 3 - Alternative Feed Sources for the Med. Region (ID: 10033)
[Argentina]

Effect of association of yeast (S. cerevisiae) with threonine in broilers feeding.

R. D. Miazzo (1), M. F. Peralta (2), A. J. Nilson (3), A. P. Magnoli (4), M. L. Picco (5)
(1, 2, 3, 4, 5) Universidad Nacional de Río Cuarto, Argentina
Corresponding author: rmiazzo@ayv.unrc.edu.ar

Yeast (Saccharomyces cerevisiae) alone, replacing part of premix or associated with E vitamin is known for its positive effects on productive performance and carcass quality. Threonine, increase the intestinal mucosae health, improving absorption capacities. The objective was to determinate the effect of Saccharomyces cerevisiae associated with threonine in diets, on productive, carcass quality and gut histo-morphometric variables in broilers. Hundred Ross male broiler were used, from birth to 43 days old, distributed in 20 pens, 5 replicated/treatment with 5 chicks/replicated. The diets were: D1: commercial type covering the minimum requirements for threonine, D2: D1 plus 0.5% yeast, D3: D1 plus 30% more than minimum threonine requirement; D4: D3 plus 0.5% yeast. The production variables (Average Daily Weight Gain (ADWG) (g/bird/day), Average Daily Consumption (ADC) (g/bird/day), and Feed Conversion Ratio (FCR)), carcass quality (Carcass Performance (CP)(%), Breast Weight (BW)(g), Thigh Weight (TW)(g) and Abdominal Fat Weight (AFW)(g)) and gut histo-morphometry (High Villi (HV,µ), Crypt Depth (CD, µ) and Villi Area (VA, µ2)) were evaluated. The production and carcass quality data were analyzed by ANOVA, while gut histo-morphometric data were analyzed by nested design with two factors and LSD test. In all case $p \leq .05$ were consider significant. Results: D4 group showed significantly better ADWG (70.97 ± 2.2 g) than D3 (67.74 ± 2.2 g); D4 broiler demonstrated significantly ($p \leq .05$) better FCR (1.79 ± .04) than D2 and D3 chickens (1.92 ± .07, 1.88 ± .03), respectively. Also, D4 broilers deposited significantly ($p \leq .05$) more BW (850.5 ± 64.6 g) that D3 chickens (750.5 ± 69.8 g) and significantly ($p \leq .05$) less AFW (36.8 ± 10.7 g) that D1 broilers (48.3 ± 7.4 g). About gut histo-morphometry, D4 group have significantly ($p \leq .05$) high CD and VA (CD:212.8 ± 33.09 µ; VA:160300 ± 36399.66 µ2) than D1 chickens (CD:139.22 ± 57.70 µ; VA:118007.1 ± 40686.11 µ2). Also, the chickens receiving threonine (D3 and D4) had higher cell sparing and high number goblet cells producing mucus in the villus. It be concluded that the combination of yeast and threonine improved in part, the productivity in broilers received them.

Keywords: S. cerevisiae, threonine, broilers, carcass quality, intestinal histo-morphometry.

[P13]: 3 - Alternative Feed Sources for the Med. Region (ID: 10034)
[Algeria]

Nutritive value of wheat bran for poultry in Algeria

D. Boudouma (1), M. Berchiche (2)
(1) Dept animal Production, ENSA, Algiers, Algeria; (2) Dept animal production, Univrsity Mouloud Mammeri, Tizi-Ouzou, Algeria
Corresponding author: dalila_boudouma@yahoo.com

While wheat bran is the most popular animal feed ingredient in Algeria, no or little information on this by-product is available. To evaluate its potential, two experiments were conducted. In the first one, 270 samples of wheat bran were analyzed for approximate composition data. The results showed a content of starch (20.76%DM) and gross energy (4750kcal/kg DM) relatively high compared to the data published in the literature. In the second experiment, 3 bioassays using chickens (30 Isa 5 broilers aged 28-36d) turkeys (10 BUT 09 aged 4-5 weeks) and layers (10 Isabrown aged 20-21 weeks), were conducted to determine the apparent metabolizable energy (AME) and true metabolizable energy (TME) values of wheat bran. Broilers, turkeys and layers were force-fed for 2 days with respectively 25, 40 and 50 g of wheat bran, and feeding was followed by a total collection of excreta for 4 days. Layers gave higher AME (2123 kcal/kg DM) value compared to those obtained with the turkeys (1957 kcal/kg DM) and broilers (1846 kcal/kg DM). The same trend was observed for TME values: 2308, 2203 and 2158 kcal/kg DM respectively for layers, turkeys and broilers. It is concluded that wheat bran is a good source of energy in poultry diet and its energetic value depends on the type of poultry. This source of variation must be taken into account by the poultry food manufacturers.

Keywords: Chemical composition, metabolizable energy, poultry, wheat bran

[P14]: 3 - Alternative Feed Sources for the Med. Region (ID: 10058)
[Egypt]

Effect of using dietary Curcuma Longa at different periods of age on some productive performance of growing chicks.

S.A. Abd El-Latif (1), A.M. Hamdy (2), M.A. Toson, (3), A.H. El-Bogdady (4), H.A. M. Elwan (5)
(1, 2, 3, 4, 5) Department of Animal Production, Faculty of Agriculture, Minia University, Minia, Egypt
Corresponding author: profshaker71@yahoo.com

This study was conducted to evaluate the effect of using dietary Curcuma longa at different levels (0 and 0.5 %) on growth performance, organ weights, and digestibility of nutrients during different periods of age (0 -3 , 4-6 and 0-6 weeks). Two hundred sixty , one- day old Arbor acres broiler chick were randomly distributed into 4 treatments, with 4 replicates of 10 birds each. The treatment groups were as follows:- T1: Basal diet (control) from 0-6 weeks of age, T2: Basal diet plus 0.5 % Curcuma longa from 0-3 weeks of age, T3: Basal diet plus 0.5 % Curcuma longa from 4-6 weeks of age,T4: Basal diet plus 0.5 % Curcuma longa from 0-6 weeks of age. Body weight and feed intake were recorded. However, feed conversion was calculated weekly. Slaughter and digestion experiments were done at the end of the experiment (6 weeks of age) to look at organs and the nutrient coefficients. The results revealed that, birds fed (T1 and T3) had the heaviest body weight compared to those fed T2 and T4. During 0-3 weeks of age feed intake increased significantly in all treatments compared to the groups of T1 and T3. At the end of the experiment 0 – 6 weeks of age, birds fed T3 and T4 had the worst feed conversion compared to the control diet (T1). Absolute and relative weight of liver, heart, gizzard and proventriculus were in general significantly ($P<0.01$) decreased by adding 0.5 % Curcuma longa at all treatments. Birds fed (T3 and T4) diets increased ($P<0.01$) significantly in the digestibility of non-corrected crude protein compared to those fed (T2) diet. Adding 0.5 % Curcuma longa to broiler diet from 0-6 weeks (T4) had significantly increased the percentage in EE% digestibility. It could be concluded that adding 0.5 % Curcuma longa to broiler diet improves body gain, some carcass characteristics and the digestibility of some nutrients significantly during 3-6 weeks period of age.

Keywords: Curcuma longa, performance, digestibility, broilers

[P15]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10044)
[Egypt]

Mapping QTL Affecting Multifactorial Traits in Chicken

M. K. Nassar (1), G. A. Brockmann (2)
(1) Faculty of Agriculture, Cairo University, Giza, Egypt; (2) Faulty of Agriculture and Horticulture, Humboldt-Universität zu Berlin, Berlin, Germany
Corresponding author: mostnassar@yahoo.com

Most of the traits considered in genetic improvement programs of growth in chicken are of multifactorial nature, e.g. body weight gain, muscle mass and fat deposit. Those traits are genetically determined by many genes. Therefore, it is desirable for chicken breeders to know the genetic determinants of these traits to be used in the breeding program. The aims of this study were to map genomic regions affecting several growth traits and estimate genetic effects of identified regions. Reciprocal F2 crosses (n = 579) between extremely inbred lines New Hampshire and White Leghorn were used to map quantitative trait loci (QTL) for growth performance (body weight and body weight gain) and body compositions (muscle mass, carcass parts and fat deposit). All animals were genotyped at 123 marker loci covering 25 chromosomes. We mapped genomic regions on 22 chromosomes affecting 24 phenotypes. Linkage analysis provided evidence for highly significant QTL effects for growth performance and body compositions on GGA2, 4 and 27. The peak QTL positions for different traits were located on GGA2 between 33.10 and 112.41 Mb, on GGA4 between 75.24 and 79.39 Mb, and on GGA27 between 3.61 and 3.82 Mb. The distal region of GGA4 (42.01 Mb - 88.41 Mb) showed the highest effects on all analyzed phenotype. This region accounting for 4.6 to 40.2% of the phenotypic F2 variance of the corresponding affected traits. Additional genome-wide significant and highly significant QTL for different analyzed traits were mapped on GGA1, 5, 7, 10, 11, 12, 15 and 26. For intramuscular fat content, a suggestive QTL was located on GGA14. Some loci have been reported in other studies. Other QTL effects were described for the first time. The difference between the parental lines and the highly significant QTL effects on GGA4 will further support fine mapping and candidate gene identification.

Keywords: muscles mass, fat deposit, QTL mapping, growth, linkage analyses

[P16]: 8 - Other / Miscellaneous (ID: 10031)

[Algeria]

Serovars of Salmonella species isolated from poultry chain in Eastern area of Algeria from 2004-2008.

A. Ayachi (1), N. Heleili (2), O. Bennoune (3), N. Alloui (4),
A. Kassah-Louar (5)
(1, 2, 3, 4) Laboratory of Microbiology (LESPA) : Veterinary Department University of BÓATNA, Algeria; (5) University Hospital Center
Corresponding author: aayachi54@yahoo.fr

Avian Salmonellosis is a worldwide disease hitting the poultry industry in underdeveloped countries as well in developed countries The aim of this study is to survey the most common salmonella serovars in the poultry chain in Eastern area of ALGERIA from 2004-2008 According to ISO 6579 method a bacteriological examination of a total 582 various samples from 48 diseased poultry in broiler chicken and laying pullets, 294 in broiler and layer reproducer breeders; 78 in hatchery and slaughterhouse, 154 in poultry products (eggs, carcasses and white sausage) 10 in feedstuff and water withdrawing showed that 22 samples harboured various Salmonella strains with an overall incidence of 3.78 %.Moreover, it was found that , there was a difference between the incidence of Salmonella isolates regarding to the source of the samples. The incidence was the highest in case of the diseased poultry samples with 14.5% were Salmonella was isolated from 8 of 48 examined diseased poultry. It was also noticed that 78 samples belonging to the hatchery and slaughterhouse have 4 positive results with an incidence of 5.12 % .As for the 154 poultry products samples which have showed the lowest incidence with 1.94% Regarding to the water sampling no strains have been isolated from 10 samples. For the Salmomella serovars they are distributed between Salmonella typhimurium; Salmonella derby ; Salmonella seftemberg; Salmonella wienn; Salmonella enteritidis ; Salmonella gallinarum, pullorum and Salmonella cerro. Further examination of the salmonella strains was carried out by testing their antimicrobial sensitivity against 13 antimicrobial used in both medical and veterinary medicine. Results showed a high prevalence of multiple resistances among these strains suggesting possible misuse of antimicrobials in poultry production.

Keywords: Salmonella prevalence, Poultry chain, ISO 6579 Method, Antimicrobial resistance

[P17]: 4 - Alternative Feed Additives for Gut Health (ID: 10013)

[Iran (Islamic Republic of)]

Effects of multi-strains probiotic (Microzist) on some intestinal characteristics and carcass chemical composition in broiler chickens

S. Karimzadeh (1), M. Rezaei (2)

(1) Ph.D Student of Animal nutrition, Department of Animal Sciences, College of Animal Science and Fisheries, Sari University of Agricultural Sciences & Natural Resources, Sari, Mazandaran, Iran; (2) Department of Animal Sciences, College of Animal Science and Fisheries, Sari University of Agricultural Sciences & Natural Resources, Sari, Mazandaran, Iran.

Corresponding author: sadegh150@yahoo.com

The present study was conducted to investigate the effects of four different levels of native probiotic (Microzist) on relative weight, length and pH value of different parts of intestine and carcass chemical composition in broiler chicks. The Microzist is a multi-strains probiotic that first time produced in Iran. The probiotic contains Leuconostoc mesenteroides, Bacillus subtilis and Lactobacillus acidophilus strains. Three hundred sixteen one-day-old male chicks (Ross 308) were distributed among 12 pens and were fed with diets containing four levels of Microzist (0, 150, 200 and 250 g/t) for seven weeks. All diets were formulated to meet the nutrient requirements of chicks (NRC, 1994). All diets were isocaloric and isonitrogenous. Birds had free access to feed and water during the experimental period. At the end of the trail (42 d) five birds per group were selected, slaughtered and carcass parameters were determined. Meat samples were collected for chemical analyses(crude protein, crude fat and ash %). Samples of intestinal digests were collected from five chicks in each pen to measure. All data were analyzed according to GLM procedure by the SAS. Differences were considered significant at $P<0.05$. The results showed that length of jejunum and ileum were significantly ($P <0.05$) increased by the addition of 200 and 250 g/t Microzist. Also relative weight of duodenum and Jejunum were significantly increased when broilers fed with high levels of probiotic. pH value of duodenum, Jejunum and ileum were significantly ($P<0.05$) decreased by 200 and 250 g/t probiotic. There were not significant differences among experimental groups in content of crude protein, crude fat and ash % in thigh and breast meat. In conclusion, result of this experiment indicated that use of Microzist up to 200 and 250 g/t can be improved the relative weight, length and pH value of different parts of intestine in broiler chickens.

Keywords: Microzist, thigh and breast meat, intestinal characteristics, broiler.

[P18]: 4 - Alternative Feed Additives for Gut Health (ID: 10040)
[Spain]

Evaluation of the Ability of Bacillus toyonensis to Modify the Invasiness of Enteric Bacteria: In Vitro and In Vivo Trials

A. Blanch (1), M. Castillo (2), D. Solà (3), G. González-Ortiz (4
(1) Andersen S.A. Spain; (2) Rubinum S.A. Spain; (3, 4) SNiBA, Departament de Ciència Animal i dels Aliments, Universitat Autònoma de Barcelona, Spain
Corresponding author: a.blanch@andersen-rubinum.com

Two in vitro trials were performed to confirm if Bacillus toyonensis interfers with the auto-inducer mechanisms of pathogenic bacteria (quorum sensing (QS)), thus inhibiting the expression of different virulence factors of pathogens. The first one evaluated the invasiveness of Escherichia coli (fimbriated (K88) or non-fimbriated (NF)) when grown with their own supernatant, with the pure cultures of Bacillus toyonensis or with their co-incubates, to intestinal epithelial cells (IPEC-J2). The second trial evaluated the invasiveness of E. coli (K88 and SF) by culturing them with the ileal and the colonic digesta from animals supplemented or not with the probiotic (109 CFU/g). The co-incubation of both E. coli with their own supernatant increased their invasiveness response. However, when they grew with the supernatant from the co-incubation of E. coli and Bacillus toyonensis, the increase in the invasiveness response was not observed. In the second trial the incubation of E. coli with the ileal supernatant lead to a reduction in the invasiveness compared to the control animals. These results suggest the ability of Bacillus toyonensis to reduce the invasiveness response of E. coli in the ileal compartment by acting on the QS systems and, in particular by degrading or inhibiting AI-2 signals. Two in vivo trials were performed with 1) broiler chickens in floor pens until slaughter 42d of age, were challenged on d3, 7 or 14 with 2 x 10^6 CFU Salmonella enterica var. enteritidis/chick and 2) Single Comb White leghorn chickens in cages until 28d of age, where challenged on d 7 with 10^8 CFU Salmonella enterica var. enteritidis /chick. At the end of the trial at 42 d, the slaughter age, 42% of untreated birds were tested positive to Salmonella, whereas Salmonella was not detected in B. toyonensis-fed chicks. In Leghorn-chickens, at 3 weeks after inoculation (the end of the trial), only 38% of birds from the B. toyonensis-fed groups were Salmonella-positive, whereas 63 % of birds were still Salmonella-positive in the untreated control treatment. The results of the present experiments indicate that feeding B. toyonensis reduces the prevalence of Salmonella in poultry.

Keywords: Salmonella, Invasiveness, Quorum sensing, Bacillus toyonensis, Broilers

[P19]: 3 - Alternative Feed Sources for the Med. Region (ID: 10073)
[Egypt]

Alternative motivation of zinc supplementation (Nano vs. Organic) in broiler diets: Effect on performance and lipid metabolism under summer season conditions

A. S. Abd El-Hakim (1), A. M. Refaie (2), N. A. Selim (3), A. R. Khosht (4)
(1, 2, 3, 4) Dept. of Poultry Nutrition, Animal Production Research Institute, Egypt
Corresponding author: hakimosaad@yahoo.com

This study designed to investigate whether source of zinc (zinc methionine or zinc oxide nanoparticles) used under two levels (100/200 mg of zinc methionine or 40/80 mg of zinc oxide nanoparticles /kg diet) and supplemented to diets containing two different oil sources (soybean oil or palm oil), is effective in alleviating the negative effect of hot weather conditions, improve lipid metabolism and antioxidant defence system in broiler chicks. Three hundred twenty broiler chicks were divided into eight treatments. Birds were placed in open house system which the ambient temperature was ranged between 29.7 to 34 OC and relative humidity ranged between 55-59%. While, Temperature Humidity Index (THI) was ranged from 29.71 to 30.95 which means that broilers were subjected to moderate heat stress. The results indicated that: 1- Chicks fed diets supplemented with zinc oxide nanoparticles showed better feed conversion ratio comparing with those fed diets supplemented with zinc methionine.2- Chicks fed high level of each zinc source recorded significantly the best feed conversion ratio.3- Chicks fed diets containing soybean oil and supplemented with zinc oxide nanoparticles at rate of 80 mg Zn/kg diet recorded significantly lower feed intake while, achieved best feed conversion.4- Plasma lipase enzyme was improved significantly in chicks fed diets supplemented with zinc oxide nanoparticles under high level by ignoring oil source.5- Blood superoxide dismutase (SOD) was significantly affected by oil sources, zinc forms and levels which, chicks fed diets contained soybean oil and supplemented with 80 mg Zn/kg diet as zinc oxide nanoparticles recorded the best value. Also, the same group achieved an improvement in economical efficiency by 20%. In conclusion: zinc oxide nanoparticles have more bioavailability than zinc methionine and this fact is proven by its beneficial effects on broiler performance and endogenous lipase and SOD enzymes under Egyptian summer season conditions.

Keywords: broilers performance, zinc nanoparticles, zinc methionine, lipid metabolism, summer season

[P20]: 4 - Alternative Feed Additives for Gut Health (ID: 10070)
[Italy]

Modulation of intestinal mucin composition and mucosal morphology of broiler chickens by the dietary inclusion of a blend of SCFA, MCFA and essential oils

M. Mazzoni (1), D. A. Quadrelli (2)
(1) Dept. of Veterinary Med. Science, Alma Mater Studiorum, University of Bologna, Italy; (2) Unione Commerciale Lombarda, 36 V. G. Di Vittorio, Brescia, Italy
Corresponding author: daniel.quadrelli@uclspa.it

Consumer pressure to reduce antibiotic use in animal feeding has resulted in the development of nutraceutics to promote good health and performances. Ent-oìl is a blend of SCFA, MCFA and essential oils, with known benefits for microflora growth, modulation and gut morphology and function. Aim of this research was to prove the effect of Ent-oìl inclusion on the jejunum mucosae of chickens. A total of 1170 1-day old Ross 308 males were divided into 2 groups of 9 floor-pen boxes of 65 birds each. Both groups received 4-phases commercial meal diets from 0 till 42 days without coccidiostatics. The difference between groups was Ent-oìl inclusion: 0,00% for Control (CTR) vs 0,15% in starter diet followed by 0,10% thereafter for Ent-oìl (EO). At the end of the trial a total of 18 (9+9) chicken guts were analyzed. In the jejunum was observed a significant increase in villus height (836 ± 127.9) in EO compared to CTR group (690.9 ± 153.6, CTR vs. E0 $P < 0.05$), and an increase of the mean values of the mucosal surface area in the EO group (12.2 ± 1.8) compared with CTR (9.5 ± 1.9, CTR vs. E0 $P < 0.01$). By means the combined alcian blue (AB)-periodic acid Schiff's (PAS) staining we observed, in the villi jejunum, a significant increase in the number of goblet cells in the EO (1625 ± 23.7) compared to the CTR group (1182 ± 19). In addition, the EO group showed a high number of PAS goblet cells (69 ± 9.7) respect to the CTR group (54.8 ± 16.6, $P < 0.05$); moreover, Ent-oìl group has a high number of AB goblet cells (111.7 ± 8.6) than that of CTR group (76.5 ± 15.4, $P < 0.01$). In conclusion, dietary inclusion with Ent-Oìl modulates broiler intestinal mucin composition and morphology.

Keywords: broiler, nutraceutics, villus, mucosa, goblet, gut health

[P21]: 3 - Alternative Feed Sources for the Med. Region (ID: 10074)
[Tunisia]

Effect of feeding inclusion Faba bean and wheat screenings, on Tunisian breeds chickens

M. Hadj Ayed (1), A. Ben Cheikh (2), M.J. Villamide (3), K. Kraïem (4)
(1, 2, 4) ISA-Chott Mariem-Univ. Sousse-Tunisia; (3) ETSIA-UP-Madrid, Spain
Corresponding author: mediha.ayed@laposte.net

The aim of this study was to evaluate the effect of dietary inclusion of Faba bean and wheat screenings, on growth performance and protein digestibility in a Tunisian chicken breed. A total of 300 local one-day-old un-sexed chicks were randomly allotted into 12 groups of 25 chicks each. A wheat-soybean meal diet (C), and a wheat-soybean meal diet containing 10%faba bean (F) were formulated to be iso-caloric (AME=12.63MJ/kg diet) and iso-nitrogenous (CP=19.2%). Four different feeding regimens (treatments) were used in a complete randomized design with 3 replicates per treatment. Diets C and F were offered ad-libitum till 123 days of age. In the other two regimens and at 15 days of age, C and F diets were diluted by supplementing wheat screenings (WS) at a gradual incorporation rate of 5% per week to make the CWS and FWS diets with a maximum 50% WS level at 12 weeks of age (84 days); this 50% level was kept constant afterwards and till the end of the trial (123 days). In all regimens, feed and water were provided ad libitum throughout the experimental period. Live body weight and feed intake (FI) were recorded weekly and mortality was registered on a daily basis. Dry and organic matter digestibility coefficients (DDM and ODM, respectively) were measured on 12 week old cockerels. Chickens fed with FWS had growth performance similar to those fed with the control (C) diet (P=0.562). Overall average daily gain was 14.5 g/bird (P=0.394) and cumulative daily FI was 57.2 g/bird (P=0.154) for all the groups. The overall cumulative feed conversion ratio was 4 kg of feed /kg of Live body weight gain, (P=0.062). The gradual incorporation of wheat screenings had no significant influence on broiler growth. Chickens fed with F had similar protein efficiency as the control birds (P= 0.07). However, WS supplementation improved it (P<0.0001). The DDM and ODM for the CWS were the highest among all the regimens (P<0.0007). Thus, the use of faba beans may replace soybean meal at a level of 10% and wheat screenings supplementation may be an efficient method to reduce feed cost without compromising the growth performance of a Tunisian breed of chickens.

Keywords: Fava bean, wheat screenings, Tunisian breeds chicken, performance.

[P22]: 3 - Alternative Feed Sources for the Med. Region (ID: 10064)
[Belgium]

Effect of Se sources and dosages on Se egg's concentration and blood parameters.

E. Delezie (1), L. Maertens (2), L. Segers (3), M. Rovers (4), N. Mahmoud (5)
(1, 2) ILVO (Institute for Agricultural and Fisheries Research), Animal Sciences Unit, Melle, Belgium; (3) Orffa Additives BV, LC Werkendam, The Netherlands; (4) Orffa Additives BV, Werkendam, The Netherlands; (5) Excentials BV, Amman 11196, Jordan
Corresponding author: evelyne.delezie@ilvo.vlaanderen.be

Developing new sources of organic selenium (Se) results in new opportunities for animal production as well as for human consumption by producing Se-enriched foods. The objectives of our trial were to compare L-selenomethionine (ExcentialSelenium4000) with another organic and inorganic Se source to investigate the effect of source and the dosage of Se supplementation on Se in eggs and blood parameters. There were 10 treatments, with 18 laying hens (55 weeks of age) per group, divided over 2 enriched cages. Treatments were a negative control (NC) diet and NC supplemented with L-selenomethionine, selenized yeast (SelPlex) or sodium selenite at 0.1, 0.3 and 0.5 mg/kg of Se. Duration of the trial was 8 weeks. At d0 and d56, Se and glutathione-SH peroxidase (GSH-Px) were analysed on 10 blood samples per group. Parameters were subjected to a factorial analysis of variance and the corresponding LSD-multiple range test. After supplementing the diets for 56 days, significantly higher Se levels (serum and eggs) and GSH-Px values were reached for the Se supplemented groups compared to the control ($P < 0.001$). An interaction between source and dosage was observed for serum Se levels as supplementing 0.3 and 0.5 mg/kg L-selenomethionine or selenized yeast instead of 0.1 mg/kg significantly increased the serum Se levels ($P = 0.008$) whereas no significant increase was found for sodium selenite. No effects of dosing or source have been observed on GSH-Px levels. However, Se in eggs was significantly influenced by dose ($P < 0.001$) and source of Se ($P < 0.001$). The Se supplementation level in the feed was detected in the eggs resulting in the highest and lowest values for 0.5 and 0.1 mg/kg, respectively and values in between for the 0.3 mg/kg supplementation level. A dose response was most pronounced for L-selenomethionine, followed by selenized yeast and to a lesser extend if Se was added as sodium selenite. It can be concluded that Se from organic sources was more bioavailable than the inorganic Se source as evidenced by blood and egg Se levels. Within the organic Se sources, L-Selenomethionine showed higher Se transfer to eggs compared to selenized yeast.

Keywords: laying hens, Selenium, sources, dosage, eggs, enrichment

[P23]: 3 - Alternative Feed Sources for the Med. Region (ID: 10068)
[India]

Effect of varying levels of metabolizable energy on the growth performance of Giriraja birds

Bhavya .T.R. (1), Venkatareddy K. (2), Malathi V. (3), Krishnamoorthy U. (4)
(1, 2, 3) Dept. of poultry Science, Veterinary college, KVAFSU, Bangalore-24 India; (4) Dept. of LPM, Veterinary college, KVAFSU, Bangalore-24 India
Corresponding author: drvenkatareddy@gmail.com

A study was conducted in the Department of Poultry Science, Veterinary college, Bangalore, India to evaluate the effect of varying levels of energy on the growth performance of Giriraja birds (dual purpose chicken). A total of 400 day old Giriraja chicks were randomly distributed into five dietary groups with four replicates per treatment and 20 chicks per replicate. The experiment lasted for 56 days during which birds were raised on deep litter following standard procedures with feed and water provided ad libitum. The five dietary treatments were isonitrogenous during the starter and finisher phases (22 and 20 % CP, respectively) but varied in their energy content during each of the phases (2600, 2700, 2800, 2900 and 3000 versus 2700, 2800, 2900, 3000, and 3100 kcal/kg, respectively). A Control group of birds was raised in similar conditions and fed diets as recommended by the Bureau of Indian Standards (BIS) for the starter and finisher phases. The results indicated that the dietary energy levels had no significant ($P>0.05$) influence on body weight gain and survivability of Giriraja chicks during eight weeks of trial. Feed consumption progressively and significantly ($P\leq0.05$) decreased with increasing level of dietary energy during both phases. The dietary energy level had significant ($P\leq0.05$) effect on feed conversion ratio. Best feed conversion rate was observed with birds fed 2800 kcal ME/kg during the starter phase and 2900 kcal ME/kg during the finisher phase. All other dietary energy levels resulted in poorer feed conversion rates. It is concluded that the optimum energy requirement for Giriraja birds is 2800 Kcal ME/kg during the starter phase and 2900 Kcal ME/kg during the finisher phase which is in confirmation with BIS recommendations.

Keywords: Metabolizable energy, Isonitrogenous, Feed conversion ratio, Dual purpose chicken.

[P24]: 3 - Alternative Feed Sources for the Med. Region (ID: 10088)
[Oman]

Performance, Meat Quality and Health Status of Broiler Chickens Fed Prosopis Juliflora Pods

W. Al-Marzooqi (1), K.K. Al-Kharousi (2), I.T. Kadim (3), O. Mahgoub (4)
(1, 2, 3, 4) Department of Animal & Veterinary Sciences, College of Agricultural and Marine Sciences, Sultan Qaboos University, P.O. Box 34, Al-Khoud, 123, Muscat, Sultanate of Oman
Corresponding author: walmar@squ.edu.om

One experiment was conducted to evaluate the use of Prosopis juliflora pods as a feed ingredient partially replacing maize as a source of energy for growing broiler chickens. Three Prosopis juliflora pods contents (5, 10 and 15%) with and without enzyme supplementation were evaluated. Daily feed intake, body weight gain and feed conversion ratio were measured. At the end of the growth study, 64 birds were randomly selected and slaughtered to evaluate carcass and meat quality traits. Substitution of corn by 10 and 15% Prosopis juliflora pods significantly depressed AME. Enzyme supplementation did not improve crude fibre digestibility. The inclusion of Prosopis juliflora pods in the diets except at 5% decreased average daily gains, feed intake and feed conversion ratio. Addition of Prosopis juliflora pods caused a significant increase in the weights of total digestive tract, pancreas and caecum. Addition of Prosopis juliflora pods or the exogenous enzyme had no significant effect on carcass or meat quality characteristics, haematology and serum biochemistry and sensory evaluation. This study indicated that Prosopis juliflora pods can be included at a level of 5% in broiler diets without affecting the bird's performance.

Keywords: Prosopis juliflora pods, Performance, Meat quality, Broiler chicks

[P25]: 8 - Other / Miscellaneous (ID: 10096)

[Jordan]

Assessment of the efficacy of aromatic plants essential oil extracts (MixOil-TM) in controlling the viral infections in poultry farms.

M.S. Khalifeh

Associate Professor, Immunobiology, Jordan University of Science and Technology, Jordan

Corresponding author: mskn@just.edu.jo

The current work was conducted to evaluate the effect of commercially available essential oils formulated in a homogenized mixture labelled as MixOil, in controlling the poultry viral disease in some Middle-eastern countries. The participating farms were located in Jordan, Egypt, and Palestine territories. The selected farms were experiencing a high mortality rate because of viral infections. The diseases were diagnosed clinically and either by molecular identification of the viruses, histo-pathological evaluation of the lesions or serologically. The outbreaks in these farms lead to very high mortality rates and they were affected by at least one of the three main poultry viruses that usually have a great impact on the poultry industry; Newcastle diseases (ND), Infectious bronchitis (IB), Avian Influenza (AI), or mixed infection of these three viruses. The introduction of MixOil treatment has led to a reduction in mortality rate after 3-4 days of application at 4 times the dose usually recommended by the manufacturer for achieving the immune boosting effect. The data collected from the farms also lead to the conclusion that the time of application of MixOil during the outbreak affected the efficacy of the treatment. Therefore, the results suggested that applying higher dose of MixOil can exceed its immune stimulator benefits and reduce the mortality rate of various viral infections. Especially if the treatment is applied early at the beginning of the outbreak.

Keywords: MixOil, Viral infections, Mortality rate

[P26]: 8 - Other / Miscellaneous (ID: 10104)
[Jordan]

Measuring the major types of immune response against Newcastle disease after liposome based new vaccine

M. S. khalifeh
Jordan university of science and technology
Corresponding author: Walidbvm@yahoo.com

Newcastle disease is a contagious disease caused by serotype I Paramyxovirus (PMVI). It can infect all types of birds, wild or domestic, and induces mainly digestive and nervous symptoms of varying severity. It affects most regions of the world and can be spread by wild birds and pigeons. This, together with the fact that natural variations to PMVI can occur, means that it is considered an extremely serious disease by all countries. Newcastle disease clinical signs are extremely variable depending on the strain of virus, species and age of bird, presence of concurrent disease, and the immune status of the bird. However, NDV may reach100 % mortality in unvaccinated poultry flocks. This high mortality rate sometimes occurs without showing any clinical signs especially when virulent strains are involved. Defence against NDV begins with mechanical and physical barriers such as skin, Interferon released from virus-infected cells within a few hours after viral invasion play a major role in immune defence against the NDV. Antibodies play an important role in day old chicks from immunized hens against Newcastle disease. Antibodies also destroy the infected cells through complement mediated cytolysis and through antibodies dependent cell-mediated cytotoxicity mechanism. The main immunoglobulin involves in virus neutralization are IgG, IgM, and IgA. In this study, Ninety Two Specific pathogen free (SPF) chickens at Age 40 weeks were divided into seven groups. These groups were vaccinated by different preparations of inactivated Newcastle local subtype. The first group received multilamellar liposomal preparation incorporated with NDV inactivated particles. The second was injected with empty multilamellar liposomal preparation mixed with inactivated NDV particles. The third group received NDV oily vaccine. The other Four groups received either antigen (NDV) alone, PBS (control), empty multilamellar liposomal preparation, and Live NDV vaccine. The immune response for chickens was monitored over eight weeks. After the fifth week of vaccination, the birds were in vivo stimulated by intravenous injection of inactivated NDV antigen. Liposomal preparation showed homogeneous multilamellar vesicles. The antibody response specific for NDV virus was tested in all groups during five weeks before and after in vivo stimulation by using HI test and ELISA. The cell-mediated immunity was tested by analyzing 10,20,30 and 40 days collected serum for the presence of ChIFN gamma. The data revealed that the liposome incorporated NDV antigen was able to activate a strong cell. The oily vaccinated group gave a strong antibody response before and after in vivo AI stimulation, the liposome incorporated NDV antigen was not able to induce a strong antibody response until the chickens were exposed to inactivated antigen in an in vivo ND stimulation. In conclusion, the incorporation of NDV killed viral particles inside multilamellar liposomes provides a promising vaccine vehicle or adjuvant to be used as stimulator of cell mediated immunity.

Keywords: New castle disease, antibodies, cell-mediated immunity

[P27]: 3 - Alternative Feed Sources for the Med. Region (ID: 10019)
[Iran (Islamic Republic of)]

The effects of different levels of pennyroyal (Mentha pulegium) on carcass characteristics and blood parameters of broilers

F. Kheiri (1), R. Shamlo (2), J.Nasr (3)
(1) Department of Animal Science, Saveh Branch, Islamic Azad University, Saveh, Iran; (2) Department of Animal Science,Saveh Branch,Islamic Azad University ; (3) Department of Animal Science, Shahrekord Branch,Islamic Azad University
Corresponding author: farshid_kheiri@yahoo.com

This study was conducted to investigate the effects of medicinal plant of pennyroyal (Menthapulegium L.) extract on carcass yield characteristics and some serum lipids in broiler chickens. A total of 320 one-day old broilers (Ross 308) were randomly allocated to 4 treatments, 4 replicates with 20 birds in each with a completely randomized design. Treatments were a Control basal diet, and pennyroyal extract-supplemented diets at various levels (50, 100, and 150 ppm). The results showed that inclusion of 150 ppm pennyroyal extract in diets increased live body weight, carcass relative weight, carcass efficiency and heart relative weight ($P<0.05$). In addition, inclusion of pennyroyal extract at levels of 100 or 150 ppm in diets increased relative weights of breast and wings ($P<0.05$). Furthermore, the highest serum cholesterol and triglyceride levels were attained by the control group ($P<0.05$). The results of the present study have shown that pennyroyal (150 ppm) can moderate the serum lipids and induce higher broiler carcasses yield. Moreover, it is proposed that pennyroyal can be used as an alternative to antibiotics in poultry production.

Keywords: Carcass Characteristics, Broilers, Pennyroyal (Mentha pulegium), Blood Parameters

[P28]: 5 - Poultry Products and Food safety (ID: 10045)
[Germany]

AviPro SALMONELLA DUO, the first bivalent Salmonella live vaccine for chicken, turkeys and ducks

D. Windhorst (1), I. Mavromatis (2), F. Monsalve (3), P. Regenhard (4), I. Schröder (5)
(1, 2, 3, 4, 5) Lohmann Animal Health GmbH, Cuxhaven, Germany
Corresponding author: daniel.windhorst@lohmann.de

The consumption of poultry meat and eggs, which represent a major source of affordable high energy protein for much of the global population, is believed to be the main cause for Salmonella infections in humans. Food-borne infections with the Salmonella (S.) serovars S. enteritidis and S. typhimurium are a serious public health concern. In a joint effort, the poultry meat and egg industry and the authorities have made significant progress in reducing the contamination rate of poultry flocks and products over the past years in Europe. Vaccination plays an important role in the overall biosecurity system on chicken farms to prevent Salmonella infections. Live attenuated vaccines derived from S. enteritidis and S. typhimurium are widely used and their efficacy, ease of use and excellent safety under field conditions has been proven. Recently, a new bivalent live vaccine consisting of live attenuated S. enteritidis and S. typhimurium strains obtained marketing authorization in Europe: AviPro® Salmonella Duo, which contains the two vaccine strains already successfully used in AviPro® Salmonella Vac E and AviPro® Salmonella Vac T. The bivalent vaccine is produced in an innovative co-fermentation process which allows the simultaneous fermentation of both Salmonella vaccine strains in one fermenter. In vitro studies provide evidence that there are no inhibitory effects of the two vaccine strains. Extensive studies demonstrated the safety of AviPro® Salmonella Duo in the target species. Efficacy was investigated after oral challenge infections with either S. enteritidis or S. typhimurium field strains. Now for the first time a bivalent Salmonella live vaccine for use in chicken, ducks and turkeys which provides homologous protection against S. enteritidis and S. typhimurium and protection against the monophasic S. typhimurium variant is registered. In chicken, the active immunization with AviPro® Salmonella Duo effectively reduces fecal shedding and the colonization of internal organs with S. enteritidis and S. typhimurium field strains and the S. enteritidis contamination of eggs. In ducks it effectively reduces the colonization of internal organs with S. typhimurium. In turkeys the active immunization with AviPro® Salmonella Duo effectively reduces the colonization of internal organs with S. enteritidis and S. typhimurium field strains.

Keywords: Salmonella Vaccine, Prevention, Enteritidis, Typhimurium

[P29]: 5 - Poultry Products and Food safety (ID: 10011)
[Lithuania]

Changes in egg quality of laying hens fed different amounts of organic acids

V. Sasyte (1), R.Gruzauskas (2), A.Raceviciute-Stupeliene (3), V. Kliseviciute (4), S. Bliznikas (5), V. Slausgalvis (6), J. Al-Saifi (7)
(1, 2, 3, 4, 5) Department of Animal Sciences, Lithuanian University oh Health Sciences, Lithuania; (6, 7) INNOV AD NV/SA, Belgium
Corresponding author: sasvil@lva.lt

The study was conducted to investigate the impact of acids mixture (butyric, lauric and propionic) on the laying hens performance and quality of eggs. The study was performed on 36 Hisex Brown laying hens. The hens (30 week of age) were assigned to three treatment groups (12 hens per each treatment group). For 8 weeks, the birds were fed compound feed 125g per day. Hens of Control group were fed compound feed; the feed of Experimental group I was supplemented with lauric and propionic acids mixture (0.5 kg/t); whereas the feed of Experimental group II contained 2.0 kg/t supplement. All laying hens were kept under the same conditions. Egg quality was determined using automatic egg quality analyzer „Egg Multi-Tester EMT-5200"; hardness of eggshell - the device „Egg Shell Force Gauge MODEL–II", and thickness of eggshell was evaluated with electronic micrometer „MITUTOYO". Draper and Hadley (1990) method (HPLC system) was used to determine the content of MDA. During the test period (30-38 weeks) the minimum dosage (0.5 kg/t) of organic acids mixture had a tendency to increase egg quality parameters (except for weight), i.e. eggshell hardness and thickness increased by 10% and 3%, respectively and the height of albumen and Haugh unit - by 4% and 6%, respectively compared to that of the Control group ($P<0.05$). In Experimental group II, the opposite was observed: 2.0 kg/t feed organic acids mixture had no effect on egg quality parameters. After storage for 28 days, MDA concentration in the egg yolk in Experimental group I decreased by 0.024 μmol/kg compared to that of the Control group ($P<0.05$). The results of the present study suggest that 0.5 kg/t supplementation of organic acids mixture tend to affect egg quality and MDA concentration, but does not affect eggs productivity and FCR of hens.

Keywords: organic acids, hens, egg quality

[P30]: 5 - Poultry Products and Food safety (ID: 10039)
[India]

Influence of rearing systems an egg quality characteristics of Guinea fowl (numida meleagris).

K.Premavalli (1), N.Ramamurthy (2), A.V.Omprakash (3), V. Balakrishnan (4), V. Appa Rao (5), R.Rajendran (6), G.Raj manohar (7)
(1, 3) Poultry Research Station, TANUVAS, Tamil Nadu, INDIA; (2, 7) Dept of Poultry science, MVC, TANUVAS, Tamil Nadu, INDIA; (4) Dept of Animal nutrition, MVC, TANUVAS, Tamil Nadu, INDIA; (5) Dept of Meat Science and Technology, MVC, TANUVAS, Tamil Nadu, INDIA; (6) Directorate of Research, TANUVAS, Tamil Nadu, INDIA
Corresponding author: drpremavalli@gmail.com

Guinea fowl (Numida meleagris) farming is gaining popularity as a diversified poultry species in India, especially Tamil Nadu. Egg quality characteristics of guinea fowl are important for its suitability as a good food item to be incorporated in various industries similar to chicken eggs. This study was conducted to assess the comparative egg quality characteristics of Guinea fowls under deep litter and cage systems of rearing. A total of 120 eighteen weeks old Guinea fowl pullets were randomly divided into two treatment groups with three replicates of 20 pullets each under both cage and deep litter system of rearing and reared from 18-95 weeks of age. Experimental birds were fed with ad libitum iso-caloric and iso-nitrogenous guinea fowl layer mash and drinking water. A total of 456 fresh eggs comprising of 12 eggs/system, 24 eggs/period for 19 periods at four weeks interval were subjected to egg quality characteristics studies. The birds reared on deep litter (38.96±0.12g) laid significantly ($p<0.01$) heavier eggs, had superior ($P<0.05$) yolk index (0.600±0.001), higher ($p<0.01$) yolk colour, ($P<0.05$) higher shell per cent (16.47±0.24) and greater ($P<0.05$) egg shell thickness (0.420±0.004mm) than eggs from caged birds. Systems of management found to have no significant influence on mean albumen index, albumen per cent. Eggs from cages (86.60±0.16) had significantly ($P<0.05$) better Haugh unit, ($p<0.01$) superior yolk per cent (30.33±0.25) than those from deep litter birds (86.32±0.13). It can be concluded that Guinea fowl raised under cage system had superior internal egg quality characteristics and Guinea fowl raised in deep litter system had better shell quality characteristics.

Keywords: Guinea fowl, Egg quality, System of rearing

[P31]: 5 - Poultry Products and Food safety (ID: 10078)
[Egypt]

Natural ways for detoxification of poultry fed aflatoxic diets

M. H. El-Deep (1), M. A. Sayed (2), S. Abou ElSoud (3), M. El-Habbak (4)
(1, 2) Animal Prod. Inst. Agric. Res..Center , Ministry of Agric, Egypt; (3, 4) Poultry Production Dept, Faculty of Agric, Kafr El-Sheikh Univ, Egypt*.
Corresponding author: mheldeep1980@yahoo.com

The main objectives of this work were to investigate; 1- the response of a local Egyptian chicken strain (Inshas) to aflatoxicosis, 2- the effectiveness of using three anti-aflatoxic agents with different mode of actions. The three agents investigated included; a) Hydrated sodium calcium aluminosilicate (HSCAS)as an adsorbent which demonstrated a high affinity for aflatoxins, b) Mannan oligosaccharide (Bio- Mos®) as a biological derivative, c) Radish extract (RE) as an antioxidant agent rich in peroxidase enzyme. The experimental design consisted of nine experimental groups: control and 8 dietary treatments as follows ; (T1) Basal diet + AF(1.0mg total AF/kg diet) , (T2) Basal diet + AF+ Bio-mos (1.0g/kg diet) , (T3) Basal diet +AF+ RE(10g/kg diet) , (T4) Basal diet +AF+ HSCAS(0.5%) , (T5) Basal diet + AF+ Bio-mos + RE , (T6) Basal diet +AF+Bio-mos +HSCAS , (T7) Basal diet +AF+RE + HSCAS , (T8) Basal diet +AF+Bio-mos +RE + HSCAS , and (T9) Basal diet (control). The investigated Characteristics included :Live body weight ; feed consumption and efficiency of feed utilization; relative weight of internal organs (bursa of Fabricius, the thymus glands, spleen , liver, the gall bladder, kidneys, ovary and testes); serum biochemical estimates (serum AST and ALT activities, total lipids, total protein, albumin, globulin, A / G ratio, creatinine, urea and calcium) ; hematological traits (Total RBC's and WBC's counts, differential leukocytic count, hematocrite %, H / L ratio); age at sexual maturity ; egg production traits (egg number / hen / first 4 k of laying , average egg weight, egg mass / hen / first 4 weeks of laying) ; immune response against NBVD; residual AF in the liver, muscles and eggs ; histapothological investigation of the liver, bursa of Fabricius, spleen, thymus glands, caecal tonsils, testes and ovary. The results obtained could be summarized as follows:

1- All traits studied were adversely affected by AF treatment.

2- The three anti – AF agents studied showed significant beneficial effects in ameliorating the adverse effects resulting from AF administration.

3- In most cases, the best protective effects were obtained with MOS and its combinations followed by HSCAS.

4- Radish extract (RE) seemed to be less effective than the other two agents.

5- In many cases RE antagonized the action of MOS or HSCAS.

Keywords: poultry, aflatoxin, HSCAS, Bio-Mos

[P32]: 5 - Poultry Products and Food safety (ID: 10016)
[Algeria]

The slaughtering hygienic practices and bacterial contamination of poultry carcass in the Biskra region (Algeria)

A. Nadir (1), G. Nadjah (2), A. Ammar (3)
(1, 2) Poultry Science Division, Batna University, Algeria; (3) Laboratory of Microbiology, Batna University, Algeria
Corresponding author: ridan2002@hotmail.com

This study consists of a survey to assess the level of compliance with good hygiene practices (GHP) in poultry slaughterhouses in the Biskra region (Algeria) and an assessment of the microbiological quality of poultry carcasses for the consumption. A total of 60 carcasses collected in 6 abattoirs have been microbiologically analysed. The study focused on the bacterial count of total aerobic mesophilic flora (TMAF) and enumeration of fecal Coliforms, Staphylococcus aureus and Salmonella qualitative research. These analyzes were made according to AFNOR standards. Survey results showed two categories of slaughtering: the first category representing 16.67% of the poultry carcasses studied is characterized by the observance of principles and standards for slaughter and a second category representing 83.33% of the poultry carcasses are characterized by unsatisfactory hygienic practices. The prevalence of infection by Salmonella and Staphylococcus aureus and at 6 slaughterhouses was 50% and 46.66% respectively. The average contamination for total mesophilic aerobic flora (TMAF), fecal coliforms and Staphylococcus aureus is approximately 5.0 log10 CFU / g and 2.18 log10 CFU / g and 1.08 log10 CFU / g, respectively. Statistical analysis showed an impact of the hygienic quality of the slaughter process on the hygienic quality of poultry carcasses. The application of good hygiene practice (GHP) and the implementation of HACCP in poultry slaughterhouses has become an absolute necessity

Keywords: poultry carcass, bacterial contamination, slaughtering, Algeria

[P33]: 6 - Poultry Housing and Management (ID: 10038)
[India]

Comparative hatching performance of Pearl and White Guinea fowl (Numida meleagris) strains in hot and humid tropics.

K.Premavalli (1), N.Ramamurthy (2), A.V.Omprakash (3), V. Balakrishnan (4), V. Appa Rao (5), R.Rajendran (6), G.Raj manohar (7)
(1, 3) Poultry Research Station, TANUVAS, Tamil Nadu, INDIA; (2, 7) Dept of Poultry science, MVC, TANUVAS, Tamil Nadu, INDIA; (4) Dept of Animal nutrition, MVC, TANUVAS, Tamil Nadu, INDIA; (5) Dept of Meat Science and Technology, MVC, TANUVAS, Tamil Nadu, INDIA; (6) Directorate of Research, TANUVAS, Tamil Nadu, INDIA
Corresponding author: drpremavalli@gmail.com

A biological experiment was conducted to study the comparative hatching performance of pearl and white guinea fowl strains (Numida meleagris) in hot and humid tropics. A total of 180 Guinea fowl birds of Pearl and White strains were randomly divided into two treatment groups (T1 and T2) with three replicates of 30 birds (24 hens + 6 cocks) each under intensive system of management at eighteen weeks of age with a breeding ratio of 4 females to 1 male were utilized for this study. Optimum mating ratio, nutrition, lighting, egg collection management for the breeders at the farm and fumigation, storage and incubational conditions for the hatching eggs at the hatchery were provided throughout the study period. Eggs were set at every four weeks interval from 28 weeks to 95 weeks of age. Hatching performance viz., mean percent fertility, total hatchability, fertile hatchability and total embryonic mortality were recorded. The results revealed that there were no significant ($p>0.05$) differences between pearl and white guinea fowl strains in hatching performance viz., mean per cent fertility, total hatchability and fertile hatchability parameters. Further, the Pearl strain had numerically better fertility, fertile hatchability and total hatchability with significantly ($p<0.01$) lower mean per cent total embryonic mortality (31.52 ± 1.39) levels compared to White strain. It can be concluded that pearl and white guinea fowl strains can be utilized as breeders for commercial keet production in hot and humid tropics.

Keywords: Guinea fowl, Hatching performance, Strain, Tropics

[P34]: 6 - Poultry Housing and Management (ID: 10028)
[Egypt]

Effect of feed form and housing system on performance of two Egyptian laying hens lines.

A. E. Abou Zeid (1), S. Z. El-Damarawe (2), A. M. Abdel-Khalek (3), F. A. Abd EL-Ghany (4), E. Abo El-Azayem (5)
(1, 2) Department of Animal Production, Faculty of Agriculture, Tanta Univ., Egypt.; (3, 4, 5) Animal Production Research Institute, Agricultural Research Center, Egypt
Corresponding author: aabdelkhalek_apri@yahoo.com

Three hundred sixty 24 weeks of age old laying hens were divided into 12 experimental groups (30 laying hens/treatment) and used in the current study. The main effects and interactions between feed form (mash and crumble), laying hens genotype (Inshas vs. Dokki-4) and housing system [individual hen battery caging (40x25x45cm3), group of 10 hen battery caging (120 x120 x 60 cm3), and 10 hen deep litter floor (2 x2.5 x3m3) were studied. All hens of both strains received a commercial layer ration containing 16.4% crude protein and 2750 kcal ME/kg. Feed and water were provided ad libitum. The following productive (24-36 week of age) and egg quality traits (32-36 week of age) were evaluated: feed intake, feed conversion ratio, egg number, egg weight, egg mass, yolk weight, albumen percent, egg shell weight, egg shape, yolk index, shell thickness and Haugh unit. Feeding crumble diet significantly improved feed conversion ratio (FCR), egg number and egg mass compared to mash diet, while feed intake and egg weight were not significantly affected by feed form. Inshas strain had significantly higher feed intake and egg weight than Dokki-4 strain, while the latter had significantly better FCR, egg number and egg mass than the former. Single housing system had significantly better FCR, egg number and egg mass compared to the other two housing systems. Of the interactions studied, only strain x housing system significantly affected FCR, egg number and egg mass. Concerning egg quality traits, feed form and housing system significantly affected shell thickness, where mash feeding and individual caging increased the shell thickness compared to corresponding factors. Strains differed significantly in the weight and percentage of yolk, albumen and shell. Some of the interactions were also significant. It was concluded that diets for laying hens in crumble form may improve various traits compared to mash feed. Significant differences between genotypes were found for productive and egg quality traits, and performance in single cages was better than in group cages and in floor pens.

Keywords: laying hens, feed form, housing system, genotype, performance

[P35]: 6 - Poultry Housing and Management (ID: 10043)
[Egypt]

Impact of egg weight selection on some egg production traits of Japanese quail

A. E. El-Dlebshany (1), M. Bahie Eldeen (2)
(1, 2) University of Alexandria, Faculty of Agriculture, Poultry production Department, Alexandria, Egypt
Corresponding author: amiraeldlebshany@yahoo.com

The aim of this study was to demonstrate correlated changes in egg production as a result of selection on egg weight. Egg weight, egg number through the first 45 days of laying (EN45), age at sexual maturity (ASM) and body weight at sexual maturity (BWSM) were recorded in Japanese quail during three generations. Differences in EN45 were significant, with 35.85 and 38.57 eggs for the control and selection population, respectively. The ASM increased significantly in the selected population as correlated response (52.53 days, compared to 50.06 days in the control population, while BWSM did not change significantly (243.84 and 245.02 g for the control and selected population, respectively). The results indicate that selection for higher egg weight in Japanese quail increased EN45 and delayed ASM, with non-significant increase in BWSM.

Keywords: correlated response, egg weight, egg production traits, Japanese quail

[P36]: 6 - Poultry Housing and Management (ID: 10063)
[Nigeria]

Preliminary report on effect of early feed restriction on growth and physiological responses in broilers during hot season.

M.O. Abioja (1), O.G. Sodipe (2), J.A. Abiona (3), T.E. Akibo (4), O.O. Adeleye (5), J.O. Daramola (6), O.A. Osinowo (7)
(1, 2, 3, 5, 6, 7) Dept. of animal physiology Federal University of Agriculture, Abeokuta, Nigeria; (4) Dept. of animal production and health. Federal University of Agriculture, Abeokuta, Nigeria
Corresponding author: dimejiabioja@yahoo.com

One hundred and sixty day-old broiler chicks (Marshal) were used to determine the effect of early feed restriction (EFR) on weight gain (WG), feed intake (FI), feed conversion ratio (FCR), blood glucose (GLU), packed cell volume (PCV), rectal temperature (RT) and heart rate (HR) in broiler chickens. Chicks were allotted to 0, 6, 12 and 18 hours feed withdrawal at 3, 4, 5 and 6 days of age. There were 4 replicates and 10 chicks per replicate. Feed was given ad libitum thereafter. Preliminary results show a significant ($P<0.05$) effect of EFR on WG, FI, FCR during d 0-7. During week 2 (d8-14), WG was not different ($P>0.05$) for 0, 6 and 18-h EFR. Chicks on 0-hr EFR had higher WG and FI than those on 18-h but lower FCR during the first week of age. GLU, RT and HR were not significantly ($P>0.05$) affected by EFR. Chicks on feed restriction regimes had started to exhibit catch-up growth during the second week.

Keywords: Heat stress, Blood glucose, Rectal temperature, Heart rate, Packed cell volume

[P37]: 8 - Other / Miscellaneous (ID: 10062)
[France]

A robust and flexible adjuvant formulation for potent and stable poultry vaccines

A. Ben Saber (1), J. Ben Arous (2), H. Imbault (3), J. Gaucheron (4), L. Dupuis (5)
(1) SEPPIC Dubai, East Wing 5, Dubai Airport Free Zone, PO Box – 54638, Dubai, UAE; (2, 3, 4, 5) SEPPIC, 22 Terrasse Bellini, Paris La Défense, 92806 Puteaux Cedex, France
Corresponding author: juliette.benarous@airliquide.com

Stable formulations of vaccine adjuvants that allow flexible oil to antigenic medium ratio are needed for the formulation of multivalent vaccines. In this study it was shown that the new resistant adjuvant Montanide™ ISA 71R VG can resist destabilizing antigenic media and conditions, and be used at flexible ratio in poultry vaccines. First, vaccines based on model antigenic medium were prepared by using Montanide™ standard and resistant adjuvants for poultry and compared for emulsion stability over time. Safety and efficacy properties of Montanide™ ISA 71R VG adjuvant were tested in geese using a Riemerella antigen in a 17 weeks trial, and in chickens using a Newcastle disease model. Slight adjuvant composition modifications allowed the formulation of vaccines to tolerate severe stress tests. In chickens and geese, resistant and standard formulations showed comparable acceptable safety levels. Chickens and geese trials also showed that there were no efficacy differences between standard and resistant adjuvants. For geese one injection of vaccine conferred stable antibody titers over 17 weeks. Even when combined with reactogenic Gram negative bacterial antigens, the Montanide™ adjuvant developed to resist destabilizing antigenic media maintains high antibody levels and an acceptable safety profile for poultry. This new line of adjuvant increases long-term stability of poultry vaccines that are based on destabilizing antigens or stored in stressful conditions. Using a Newcastle disease model vaccine, it was demonstrated that this new adjuvant is safe and improves vaccine efficacy in poultry.

Keywords: vaccine, adjuvants, formulation, stability

[P38]: 8 - Other / Miscellaneous (ID: 10061)
[Pakistan]

Effects of Fish Oil on Growth Performance, Antibody Response and on Lymphoid Organs of the Broilers Experimentally Infected With Avian Influenza H9N2

A. Aslam (1), B. Zahid (2), Ihsan A. (3)
(1) UVAS,LHR, PAKISTAN; (2, 3) UVAS,LHR,PAKISTAN
Corresponding author: bz-leo@hotmail.com

Avian influenza (AI) is an important infectious disease of poultry which cause immune suppression and immune organs damage in broilers. Dietary supplementation of fish oil (FO) enhances the immune status and subside inflammation. The current study was design to study the effect of FO on lymphoid organs through histopathology, performance and antibody response in H9N2 infected broiler chickens. A total of 80 chicks were divided into groups A, B, C and D. Groups A and B were challenged with Avian influenza virus (H9N2) at 21 days of age, groups B and C were fed a diet with 3% FO, and group D was a negative control. Groups A and D were fed cooking oil. For virus isolation, 21 samples were collected and 8 (40%) were positive for H9. The virus titer ranged from 1:64 to 1:512. The feed conversion ratio (FCR) of fish oil treated broilers was significantly lower than those receiving diet with cooking oil before virus inoculation. Furthermore a significant difference was observed in FCR after the challenge with highest value for group A followed by group D, B and C. The Geometric mean titers (GMT) for H9N2 and Newcastle Disease virus (NDV) were recorded weekly up to 42 days of age using the hemagglutination inhibition assay. The H9N2 GMT for groups A, B, C, and D at 42 days of age were 208, 832, 0 and 0, respectively. The H9N2 antibody titer for group B was higher than groups A, C and D. Before the challenge at 20 days of age, group C showed highest NDV GMT value (8.0) followed by group B (5.7), A (3.2), then D (2.8). However, after the challenge, the highest NDV GMT value was observed in group C with 294.1, followed by groups B, D, and A with GMT values of 208, 128, and 23, respectively on day 42 of age. Hypertrophy, increase lymphocytes and presence of lymphoblast were observed in FO fed birds.

Keywords: Fish oil, Histopathology, Lymphoid organs, Broiler, AI virus H9N2

[P39]: 8 - Other / Miscellaneous (ID: 10060)

[Pakistan]

Conventional and Molecular Methods for Detection of Infectious Bursal Disease Virus In Broiler Chicken

Z. Beenish (1), A. Asim (2), A. Sohaib (3)

(1) University of Veterinary and Aniaml Sciences, Lhr Pakistan; (2, 3) Department of Pathology, University of Veterinary and Animal Sciences, Lahore.

Corresponding author: bz-leo@hotmail.com

The present study was conducted to compare the different diagnostic methods for detection of Infectious Bursal disease virus (IBDV) in broiler chickens. For this purpose a total of 100 samples of Bursa of fabricious were collected from poultry flocks of Punjab Pakistan (during the period from the Dec 2012 to May 2013), during the samples collection detailed information regarding age, breed, and history of previous disease outbreak, vaccination and treatments were recorded. IBDV isolation from field sample was performed by inoculating the suspected bursa samples in embryonated chicken eggs through chorioallantoic membrane. Virus was confirmed through conventional serological method Agar Gel precipitation test and molecular method Reverse transcriptase-polymerase chain reaction (RT-PCR). The VP2 region of the IBDV gene was analyzed, and a 743-bp product was obtained using specific primers. RT-PCR is concluded more accurate, sensitive and specific method for rapid detection of infectious bursal disease virus from field samples.

Keywords: Broiler chicken, IBDV, Bursa, RT-PCR, EGG Inoculation

[P40]: 8 - Other / Miscellaneous (ID: 10009)
[Algeria]

Emergence of Plasmid-Mediated Quinolone Resistance Gene qnrS in enterobacteriacea of poultry origin in Algeria

M.H. Ben-Mahdi (1), Q. Benameur (2), F. Assaous (3), K. Rahal (4)
(1) Research Laboratory of Animal Health and Productions, National High Veterinary School, Algiers, Algeria; (2) Regional Veterinary Laboratory of Mostaganem, Algeria. ; (3, 4) Medical Bacterial Department, Pasteur Institute of Algeria, Algiers Algeria.
Corresponding author: mhbenmahdi.ensv@gmail.com

Plasmid-mediated quinolone resistance (PMQR) of Enterobacteriaceae encoded by qnr genes is a worldwide emerging concern in veterinary medicine. The occurrence of these resistance determinants in poultry products in Algeria is still not documented. The aim of this study was to assess the antibiotic resistance profile and to investigate for qnr PMQR in 253 multi drug resistant(MDR) Enterobacteriaceae strains isolated from poultry farms in western Algeria. A total of 310 healthy chickens samples were collected from six different poultry farms. Isolated strains were tested for antimicrobial susceptibility by Agar disc diffusion assay and 18 MDR strains randomly selected were screened by multiplex PCR for detection of plasmid-mediated quinolone resistance(qnr) genes (qnr A, qnr B, qnr S). Two hundred and fifty three (253) Enterobacteriaceae strains were isolated, 94,86°% were either nalidixic acid and flumequine resistant. Two isolate strains (E. coli and Enterobacter cloacae) were carrying qnrS (11,11 %) while qnrA and qnrB were not detected. This is the first report on identification of the qnrS gene in E.coli and Enterobacter cloacae strains isolated from poultry product in Algeria. Further studies have to be conducted to determine the real prevalence of qnr genes.

Keywords: Antimicrobial resistance, Enterobacteriaceae, Poultry, Plasmid-mediated quinolone resistance (PMQR)

[P41]: 8 - Other / Miscellaneous (ID: 10049)
[Pakistan]

Evaluation of carcass traits in both the sexes of Japanese quail (Coturnix coturnix japonica) from 3 to 5 weeks of age

A. S. Jatoi (1), M. Akram (2), S. Mehmood (3), J. Hussain (4), H. M. Ishaq (5), Y. Abbas (6)
(1) Department of Poultry Husbandry, Shaheed Benazir Bhutto University of Veterinary and Animal Sciences, Sakrand, Pakistan ; (2, 3, 4, 5) Department of Poultry Production, University of Veterinary and Animal Sciences, Lahore, Pakistan; (6) Department of Poultry Production, College of Veterinary and Animal Sciences, Jhang, Pakistan
Corresponding author: drasultan_jatoi@yahoo.com

The present study was planned to investigate the carcass traits in four strains of Japanese quails maintained at Avian Research and Training Centre, University of Veterinary and Animal Sciences, Lahore during 2012-13. For this purpose, two thousand one hundred and sixty, newly hatched quail chicks were randomly picked up from available stock and then placed into 108 experimental units. Fresh and clean drinking water was provided at all times through automatic nipple drinkers. The birds were fed ad libitum quail ration according to NRC standards. Data were analyzed by ANOVA technique and means were compared by using DMR Test. The results showed that the mean slaughter weight (g) of male and female Japanese quails showed significant ($P < 0.05$) differences in week-3 4 and 5; while, non-significant difference was observed at week-5 only in male quails. The dressing percentage was found non-significant ($p > 0.05$) difference in all the weeks except in male quails at week-4. The keel length (cm) was found non-significant ($p > 0.05$) difference in all the weeks except in female quails at week-3. Significant difference ($P < 0.05$) difference was observed in respect of keel angle in male quails at week-5 and in female birds at week-3. Non-significant ($P > 0.05$) differences were observed in respect of shank length (cm) in all the weeks except female quails at week-4. The mean liver weight was found to be significant ($P < 0.05$) only in female quails at week-4. Significant ($P < 0.05$) effect on mean weight of heart at week-3 in male birds, while, at week 4 and 5 in female quails. The mean empty gizzard weight of male quails was found to be significant ($P < 0.05$) difference only in week 4, whereas, a non-significant difference was observed in all weeks in both the sexes. The intestinal length of male Japanese quails was found to be significant ($P < 0.05$) difference in all weeks, whereas, female birds only at week-5.

Keywords: Japanese quail, carcass traits, giblets, intestinal length.

[P42]: 8 - Other / Miscellaneous (ID: 10022)

[Croatia (Hrvatska)]

Experimental infection of laying hens with highly pathogenic Salmonella enteritidis previously isolated from poultry farm

E. Prukner-Radovcic (1), D. Horvatek Tomic (2), M. Lukac (3)
(1, 2, 3) Faculty of Veterinary Medicine University of Zagreb, Croatia
Corresponding author: prukner@vef.hr

Salmonella enterica serovar entertitidis (SE) is one of the main causes of food borne diseases, transmitted by eggs or egg products. The aim of the present study was to investigate the prevalence of SE in specimens collected from experimentally infected laying hens. In the two trials two lines of commercial laying hens at onset of the lay were orally inoculated with a single dose of 1.2x109 CFU of highly pathogenic SE. After infection the inoculated bacteria were recovered in all hens. Despite the fact that all hens became infected, we found a low number of positive eggs.

Keywords: poultry, laying hens, Salmonella enteritidis, eggs

[P43]: 8 - Other / Miscellaneous (ID: 10081)
[Egypt]

Investigating the Effect of Probiotics on Chicks Haematologalical , Enzyme Biochemical, Fertility and Semen quality

M. H. El-Deep (1), M. A. M. Sayed (2), K. Amber (3)
(1, 2) Animal Prod. Inst. Agric. Res..Center , Ministry of Agric, Egypt.; (3) Poultry Production Dept, Faculty of Agric, Kafr El-Sheikh Univ, Egypt*.
Corresponding author: mheldeep1980@yahoo.com

This study was conducted to investigate the effect of effective microorganisms (EM) probiotics on the hematology , enzyme biochemistry, Fertility, hatchability and Semen quality of Inshas chickens (a local Egyptian chicken strain). 540 chicks were randomly selected from 1 to 5 treatments: 1) no probiotics (control); 2))Basal diet + EM (2.5 ml/kg diet); T3) Basal diet + EM (5.0 ml/kg diet); T4) Basal diet + EM (7.5 ml/kg diet); T5) Basal diet + EM (10.0 ml/kg diet) . The feeding treatment started at 4 weeks of age and lasted to 41 weeks of age. The investigated characteristics were semen quality (semen volume, sperm motility, sperm cell concentration, and abnormal and dead sperm count), fertility, hatchability and chick weight, serum biochemistry (total protein, albumin, globulin, uric acid, and creatinine concentrations), and hematology (total red blood cell and white blood cell counts, differential leukocyte count, hemtocrit, and hematocrit:leukocyte ratio). The results showed that all studied characteristics were positively affected by the feed additive treatments. In many cases, the basal diet + EM (10.0 ml/kg diet) gave the best results.

Keywords: probiotic, enzyme biochemistry , fertility ,semen quality

[P44]: 8 - Other / Miscellaneous (ID: 10051)
[Algeria]

Isolation of cationic antimicrobial peptides from heterophils

O. Bennoune (1), M. Melizi (2), K. Khazal (3), R. Bourouba (4), A. Ayachi (5)
(1, 2, 5) Laboratory of health, animal production and environment (ESPA), Department of Veterinary Medicine, University of Batna, ALGERIA; (3) School of veterinary medicine, Tuskegee University, Tuskegee Alabama, AL 36088, USA; (4) Department of Biology, Faculty of Science, University of Batna, ALGERIA
Corresponding author: bennouneo@yahoo.fr

Cationic antimicrobial peptides have been extensively studied during the last three decades. These molecules have remarkable antimicrobial activity against multi-resistant bacteria, fungi and even viruses. These cationic peptides tend to be found in the most exposed parts of the body to infections like the digestive and respiratory systems and form the first guard against invading microorganisms. These peptides form the backbone for future potent antibiotics and natural feed additives. Our actual work consists on the isolation of cationic antimicrobial peptides from chicken heterophils. These leucocytes are the equivalent of mammalian neutrophils and their antimicrobial activity depend mainly on non-oxidative mechanisms. These cells were obtained from the peritoneal cavity during the exudative phase of induced inflammatory process. The heterophils were separated and homogenized and their cytoplasmic granules were obtained. The granules have been extracted overnight in 5% acetic acid, dialyzed, lyophilized and re-suspended in 0.01 % acetic acid and their protein content was determined using the Lowry method. These molecules expressed extraordinary cationic mobility on acid urea polyacrylamide gel electrophoresis according to the technique described by Harwig et al. (1993) and showed potent antibacterial activity against standard strains of Staphylococcus aureus and Escherichia coli according to an ultrasensitive assay described by Lehrer and his co-workers (1991) with little modifications. Therefore, the chicken heterophils, the equivalent of mammalian neutrophils, are well equipped with potent non-oxidative antimicrobial mechanisms where the cationic antimicrobial peptides are the major components and form a potent barrier of non-specific immunity and the first shield of defence against invading microorganisms.

Keywords: cationic peptides, antimicrobial, isolation, heterophils

[P45]: 8 - Other / Miscellaneous (ID: 10020)
[United Arab Emirates]

Variant Infectious Bronchitis strains in the Middle East

Husam Bakri
Global expert - MSD, UAE
Corresponding author: husam.bakri@merck.com

Infectious Bronchitis is considered as one of the acute, highly contagious respiratory diseases of chickens caused by corona virus. The disease is characterized by tracheal rales, coughing and sneezing. In addition young chickens may have nasal discharge while in laying flocks there is usually a drop in production. Middle East countries have an estimated poultry population of 3 billion broilers, 137 million commercial layers, 30 million breeders, 2x106 layer breeders and 500.000 GP broilers. In the last few years it was noticed that breeders and layers flocks in the Middle East area were facing different problems such as false layers, Penguin position, drop in egg production and no peak in production; while broilers were suffering from high mortality 25% with an increase when it is combined with AI-H9N2 or ND. Different samples from layers, breeders and broilers were taken and analyzed using HI and PCR techniques. The results showed that different IBV variant strains were playing a role in the Middle East. Nevertheless, we were able to control the disease by using protectotype concept (Ma5 and the variant strain 4/91). The reduction in mortality, improvement in the body weight, feed conversion, production and egg quality were our parameters.

Keywords: IBV variants; Middle East; Protectotype approach

[P46]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10052)

[Nigeria]

Effect of Egg Yolk Extender on Cock Semen of Different Strains of Chicken

A. O. Ladokun (1), J. O. Daramola (2), O. E. Oke (3), S. O. Fagbohun (4)

(1, 2, 3, 4) Dept. of Animal PhysiologyFederal University of Agriculture Abeokuta, Nigeria

Corresponding author: bimoladox@yahoo.co.uk

An experiment was conducted to study the effect of egg yolk extender on four different genotypes of birds namely Di-hybrid Normal (DN), Indigenous normal neck (INN), Giri raja (GR) and Rhode Island Red (RIR) maintained at the Animal Breeding unit of the Research farm of the Federal University of Agriculture, Abeokuta, Nigeria. There are on-going concerted efforts at improving Nigerian Indigenous Chickens (NIC). These genotypes with exception of RIR are some results of these efforts. Transportation and extension of semen for artificial insemination of hens on farms not within the immediate locality poses a great challenge to on-farm trials for this improved genotypes. The egg yolk (prepared beforehand) was diluted with the semen based on the volume of ejaculate from each genotype and the semen was stored in a refrigerator at 40C. The effect of egg yolk on the semen from each genotype was evaluated at 24 hours, 48 hours, 72 hours, and 96 hours. The percentage livability of DN at 0, 24, 48, 72, and 96 hours were 59.48, 53.32, 43.19, 22.90 and 10.88 respectively. Percentage dead at 0 hours to 96 hours were 40.50, 46.95, 56.80, 77.09, and 89.12 respectively. The numbers of intact acrosome at 0, 24, 48, 72, and 96 hours were 17.50, 15.00, 10.50, 8.00, and 6.00 respectively. The percentage livability 0f INN at 0, 24, 48, 72, and 96 hours were 55.04, 51.82, 43.74, 27.13 and 13.44. Percentage dead from 0 hours to 96 hours were 44.69, 48.17, 56.25, 72.86, and 86.50. The numbers of intact acrosome at 0, 24, 48, 72, and 96 hours were 11.50, 12.50, 9.00, 6.50, and 5.00. The percentage livability of GR at 0, 24, 48, 72, and 96 hours were 57.95, 53.03, 44.19, 32.64 and 16.31. Percentage dead from 0 to 96 were 42.02, 46.96, 55.80, 67.83, and 83.69 respectively. The numbers of intact acrosome at 0 hour, 24 hours, 48 hours, 72 hours, and 96 hours were 18.00, 17.50, 16.50, 12.00, and 9.00. The percentage livability at 0, 24, 48, 72, and 96 hours were 59.69, 52.53, 46.00, 36.95 and 13.83 respectively. Percentage dead from 0 hours to 96 hours were 40.31, 47.47, 53.94, 62.71, and 86.16 respectively. The numbers of intact acrosome at 0, 24, 48, 72, and 96 hours were 23.50 23.00, 19.00, 16.00, and 10.50. The variations observed on the effect of egg yolk extender in this study suggest that it has varying effects on cock semen of different genotypes. Also, as semen storage increased from 0 hours to 96 hours, the fraction of spermatozoa with abnormalities in morphology that may limit fertilization also increases regardless of strain. It was concluded that egg yolk extender use is optimal at 24 hours at ambient temperature without refrigeration or freezing.

Keywords: Semen, Egg Yolk, Extender, Chicken Strains

[P47]: 9 - Poultry Health: Current Challenges and Future Approaches to Disease Control (ID: 10035)
[Australia]

Emu Oil source does not significantly alter therapeutic efficacy, whilst Ostrich Oil has no beneficial effect, in a rat model of chemotherapy-induced intestinal mucositis

S. Mashtoub (1), K. Y. Cheah (2), K. A. Lymn (3), G. S. Howarth (4)
(1) School of Medicine and Pharmacology, Fremantle Hospital, The University of Western Australia, Fremantle, Western Australia; Gastroenterology Department, Women's and Children's Hospital, North Adelaide, South Australia; (2) Gastroenterology Department, Women's and Children's Hospital, North Adelaide, South Australia; (3, 4) Gastroenterology Department, Women's and Children's Hospital, North Adelaide, South Australia; School of Animal & Veterinary Sciences, The University of Adelaide, Roseworthy Campus, South Australia, Australia
Corresponding author: suzanne.mashtoub@gmail.com

Our previously published pre-clinical studies have identified Emu Oil (EO) as a potential therapy for ulcerative colitis (Dig Dis Sci, 2012), NSAID-induced enteropathy (Ev Based Comp Alt Med, 2013) and chemotherapy-induced mucositis (Exp Biol Med, 2013). Should EO become indicated for human medical use, it would need to conform to much tighter regulation related to farming, manufacture and processing practices. The current study compared the efficacy of three different EO sources (EO1-3) with oil derived from another flightless bird, the Ostrich, in a rat model of intestinal mucositis. Two different Emu Oil batches from the same company (EOs 1 and 2) and a formulation from a second company (EO3) were compared. Female Dark Agouti rats (n=8/group) were gavaged with water, Olive Oil (OlO), EO1-3, or Ostrich Oil (OsO) once daily (1ml); injected intra-peritoneally with 5-Fluorouracil (5-FU) or saline on day 5 and euthanized on day 10. Daily data (body weight (BW), food and water intake, faecal and urine output) and disease activity index (DAI) were quantified. $p<0.05$ was considered significant. On Day 10, 5-FU significantly reduced BW gain (105±1% of starting BW) compared to healthy controls (113±1%; $p<0.001$). Total water intake and urine and faecal output did not differ significantly among treatment groups prior to 5-FU (Day 1-5), or during the damage (D6-8) or recovery phases (D9-10). More importantly, food intake was significantly improved by all three EO samples and OlO during the phases of intestinal damage and repair (D6-10; saline control 56±2g; 5-FU control: 36±3g; 5-FU+EO1: 81±6g; +EO2: 79±8g; +EO3: 76±8g; +OlO: 70±11g; $p<0.05$); an effect not reflected by OsO (27±3g; $p>0.05$). DAI score was significantly elevated on Day 6 by 5-FU (1.6±0.3) compared to healthy controls (0.5±0.2). Notably, there were no significant differences in DAI among the EO samples. The three Emu Oil formulations achieved similar effects on metabolism parameters and mucositis disease activity, with no therapeutic effect of Ostrich Oil. Although a limited study, these initial results imply that Emu Oil formulations sourced from different batches and commercial companies would be likely to achieve similar outcomes with respect to clinical efficacy.

Keywords: Emu; Ratite; Oil; Chemotherapy; Intestinal damage

[P48]: 3 - Alternative Feed Sources for the Med. Region (ID: 10103)
[Pakistan]

Effect of protease supplementation in low protein and amino acids diets on growth, digestibility and meat characteristics of broilers

Z. Ur-Rehman (1), J. Kamran (2), G. Ahmad (3), A. Tanveer (4)
(1) Department of Poultry Science, PMAS Arid Agriculture University, Rawalpindi, Pakistan; (2) Khushal Feeds and Farms, Islamabad, Pakistan; (3) SB Feeds, Mandra, Rawalpindi, Pakistan ; (4) Department of livestock production and Management, PMAS Arid Agriculture University, Rawalpindi, Pakistan
Corresponding author: zaib_rehman90@yahoo.com

The objective of the research was to study the effect of three commercial proteases (CP) on broiler growth, dressing percentage, breast meat yield, abdominal fat content and digestibility in diets low in crude protein and digestible amino acids. Day-old broiler chicks (n=625) were randomly divided into 5 groups of five replicates each; there were 25 birds in each replicate. Ration B was formulated to have 19.45 % CP, while rations A, C, D and E having 19% CP and 7% less digestible amino acids and supplemented with protease, Cibenza DP 100, Ronozyme Pro Act CT and Winzyme at the rate of 0, 0.5, 0.2 and 0.5 kg/ton, respectively. All rations were isocaloric (2825 kcal/kg). Chicks were offered the rations up to age of 42 days. The collected data was subjected to statistical analysis using completely randomized design with GLM procedure of SAS. Addition of proteases to low CP and digestible amino acids diet improved ($p<0.05$) weight gain, FCR, nitrogen retention and liver weight. All treatment diets showed similar results ($p>0.05$) in terms of mortality, dry matter digestibility, carcass yield, dressing percentage, giblet weight and abdominal fat content. Based on the results of the study, it was concluded that addition of protease in low CP and digestible amino acid diet is a real opportunity for nutritionist to formulate an economical broiler ration.

Keywords: protease, broiler, protein digestibility, performance

[P49]: 3 - Alternative Feed Sources for the Med. Region (ID: 10102)
[Iran (Islamic Republic of)]

Comparison of different methods of metabolizable energy determination of corn gluten meal in Japanese Quails (Coturnix coturnix Japonica

I Hajkhodadadi
Department of Animal Science, Faculty of Agriculture and Natural Resources, Arak University, Arak, Iran
Corresponding author: imanhkhodadadi@yahoo.com

The present study was conducted to investigate the efficiency of total (tc) or partial (acid insoluble ash method) (AIA) excreta collection as methods of metabolizable energy (ME) determination of corn gluten meal (CGM) in Japanese quail. Two hundred mature male quails, with 134± 4 g mean live weight, were allocated in a completely randomized design to five treatments: Reference diet with total collection method (RD-tc), Reference diet with AIA method (RD-aia), Test diet with total collection method (TD-tc), Test diet with AIA method (TD-aia) and a group for determination of endogenous losses (Eo). The reference diet (RD) was formulated to supply the birds nutritional requirements (NRC , 1994). Test diet (TD) was 30 % CGM and 70% RD. The experimental period was 28 days with 14 days for adaptation and final seven days for feed intake (FI) record and excreta collection. No significant differences (P>0.05) were found between TC and AIA method in energy values of CGM for Japanese quail. The means of AME and nitrogen corrected AME (AMEn) of the CGM with TC and AIA method were 3284.58 and 3390.25 Kcal/kg and 3325.00 and 3475.21 Kcal/kg , respectively. No significant difference (P<0.05) was found between AMEn value of corn by TC method in quail (3425.00 Kcal/kg) and that of NRC (1994) (3350.00 Kcal/kg). Total ME and TMEn values varied from 3167.20 to 3340.4 Kcal/kg and 2965.98 and 3097.66 Kcal/kg for CGM with TC and AIA method, respectively. Metabolizable energy estimated by internal marker method (AIA) was similar to that of TC method, demonstrating that total excreta collection can be replaced by acid insoluble ash (AIA) marker method in for mature male Japanese quail. The difference observed in the ME values of CGM in this study as compared to NRC recommendation suggested that Japanese quails may be using CGM energy content less efficiently as compared to chickens.

Keywords: Corn Gluten Meal, Energy, Japanese quail, Total Collection

[P50]: 5 - Poultry Products and Food safety (ID: 10105)
[Belgium]

"Ecology from farm to fork of microbial drug resistance and transmission" EU project against antimicrobial resistance.

H. Van Meirhaeghe (1), M. De Gussem, on behalf of the EFFORT consortium (2)
(1, 2) Vetworks, Knokstraat 38, B-9880 Poeke, Flanders, Belgium
Corresponding author: hilde.vanmeirhaeghe@vetworks.eu

"Ecology from farm to fork of microbial drug resistance and transmission" (EFFORT) is an EU FP7 project, that started on December 2013 and will last five years. The focus of the project will be on understanding the eco-epidemiology of antimicrobial resistance (AMR) from animal origin. Real-life intervention studies will be conducted aiming at reducing the use of antimicrobials in veterinary practice. The project results will be used in prediction models, with the goal of limiting human exposure to the most clinically important antibiotics. The EFFORT trans-disciplinary consortium is made up of 20 partners from 10 European countries. This consortium research will provide scientific evidence and high quality data that will inform decision makers, the scientific community and other stakeholders about the consequences of AMR in the food chain, in relation to animal health and welfare, food safety and economic aspects. These results will afterwards be of use to support political decisions and to prioritize risk management options along the food chain.

Keywords: antimicrobial resistance, eco-epidemiology, animal health, food safety

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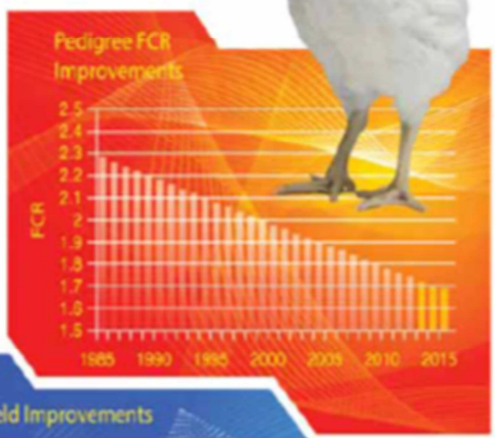

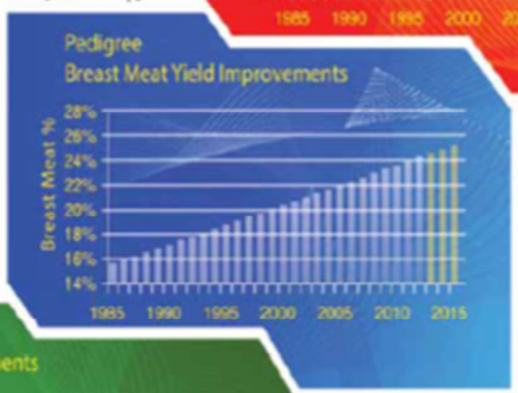

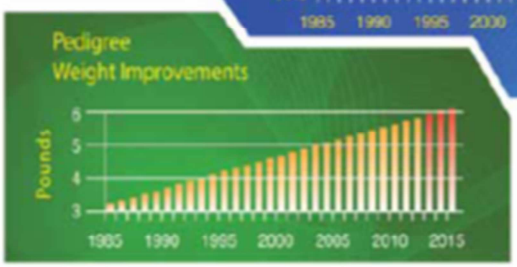

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نموذج يقدم كافة الوظائف والمزايا الأساسية لحاضنة حديثة أحادية المراحل.

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منتج من أعلى مستوى فريد من نوعه يضيف وجهة إستخدام متقدمة ووظائف تحكم ذاتي مرتكزة على تقنية Embryo-Response Incubation™

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