Poultry production in nigeria

Introduction

The interest in poultry and poultry products have grown tremendously in the last 20 years faster than otherfood-producing animal industries on how the bird products are produced, processed, consumed and marketed. Almost every country in the world has a poultry industry of some kind. The biggest challenge of commercial poultry production is the availability of good quality feed on sustainable basis at stable prices. In spite of this challenge, commercial poultry production ranks among the highest source of animal protein (Iyayi, 2008). Mojtaba Yegani) Poultry meat and egg production have shown a considerable increase since 1970. The increase in the size of the poultry industry has been faster than other food-producing animal industries. Growth in livestock production in both developed and developing countries has been led by poultry. From the 1990s to 2005, consumption of poultry meat in developing countries increased by 35 million tons – almost double the increase that occurred in developed countries.

The trade volume of poultry products has also increased parallel to the rapid growth of global poultry meat and egg production. The increase in poultry meat consumption has been most evident in East and Southeast Asia and in Latin America, particularly in China and Brazil. The share of the world's poultry meat consumed in developing countries rose from 43 to 54 percent between 1990 and 2005, which accounted for 36 percent of the large net increase in meat consumption in developing countries over this period.

Further, the proportion of the world's poultry meat produced in developing countries rose from 42 to 57 percent. It is estimated that produc¬tion and consumption of poultry meat in developing countries will increase by 3. 6

percent and 3. 5 percent, respectively, per annum from 2005 to 2030 because of rising incomes, diversification of diets and expanding markets, particularly in Brazil, China and India. Poultry meat and egg production have shown a considerable increase since 1970.

The increase in the size of the poultry industry has been faster than other food-producing animal industries. The trade volume of poultry products has also increased parallel to the rapid growth of global poultry meat and egg production. It seems that things have started to change. Feed prices, as the major expenditure of poultry production, are increasing. Disease outbreaks and related issues continue to cause significant economic losses in the industry. Nowadays, consumers are paying much more attention to quality and safety of poultry products that they eat.

The trends described above, and our current knowledge of smallholder involvement, raise a critical issue: for once, a sector in which the poor are heavily involved is growing. Table 2 shows that in fact pork and poultry are the prominent growth sectors of develop¬ing-country agriculture. If the poor fail to remain active in this sector, they will have missed a tremendous opportunity to improve their livelihoods. If they participate, farm income could rise dramatically; however, the conditions under which this could occur are unclear.

Although the above-mentioned issues are real, it has also been suggested that the principal reason for the exit of smallholders from livestock production in developed coun¬tries is that they are not competitive with the larger operations that benefit from both technical and allocative economies of scale embodied in genetic improvement of animals and feeds or improved organization – especially in the case of poultry and pig production where profitable adoption simply requires larger farm sizes (Narrod, 1997; Martinez, 2002; Morrison Paul et al. , 2004).

This is a particularly difficult issue for smallholders, as it con¬veys a sense of inevitable economic doom propelled by irreversibletechnological progress. Anecdotal experience suggests that many livestock production experts do not look much beyond this explanation when assuming the inevitability of livestock industrialization in developing countries.

History Of Poultry Birds

In ancient time all poultry birds lived in forest. In ancient Greece, chickens were still rare and were a rather prestigious food for symposia. Delos seems to have been a center of chicken breeding. The Romans used chickens for oracles, both when flying (" ex avibus", Augury) and when feeding (" auspicium ex tripudiis", Alectryomancy). The hen (" gallina") gave a favourable omen (" auspicium ratum"), when appearing from the left (Cic. , de Div. ii. 26), like the crow and the owl. For the oracle " ex tripudiis" according to Cicero (Cic. de Div. ii. 34), any bird could be used, but normally only chickens (" pulli") were consulted. The chickens were cared for by the pullarius, who opened their cage and fed them pulses or a special kind of soft cake when an augury was needed.

If the chickens stayed in their cage, made noises (" occinerent"), beat their wings or flew away, the omen was bad; if they ate greedily, the omen was good. In 249 BC, the Roman general Publius Claudius Pulcher had his chickens thrown overboard when they refused to feed before the battle of Drepana, saying " If they won't eat, perhaps they will drink. " He promptly lost the battle against the Carthaginians and 93 Roman ships were sunk. Back in Rome, he was tried for impiety and heavily fined. In 161 BC, a law was passed in Rome that forbade the consumption of fattened chickens.

It was renewed a number of times, but does not seem to have been successful. Fattening chickens with bread soaked in milk was thought to give especially delicious results. The Roman gourmet Apicius offers 17 recipes for chicken, mainly boiled chicken with a sauce. All parts of the animal are used: the recipes include the stomach, liver, testicles and even the pygostyle (the fatty " tail" of the chicken where the tail feathers attach). India and middle area of east Asia is considered as the original homeland of chicken. Jungle chicken of prehistoric era first raised as domestic bird in some area like Malay and Java of south east Asia. Then people used to hunt bird form jungle for meat and raise them at home for chicken fight as a source of entertainment. It is thought that, modern chicken originated from red jungle chicken of that time.

The Global Importance Of Poultry

PoultrySciencepublishes papers on fundamental and applied research on poultry species. A recent editorial addressed the increase in the number of papers being published in the journal and the high impact factor for the journal (Scanes, 2007). It is argued that one of the reasons for the increases in both the size and the impact factor for the journal is the increasing importance of poultry production and products worldwide. Globally, production of the primary poultry products (meat and eggs) has been rising rapidly. This reflects consumption based, in turn, on consumer preference for these high-quality products and the relatively low price because of efficiency of production. Over a 10-yr period between 1995 and 2005, consumption, and hence production, has increased globally (percentage ncrease) for chicken meat (53%), turkey meat (13%), duck meat (67%), goose meat (53%), chicken eggs (39%), and other eggs (27%). The statistics on poultry production do not consider the value added to poultry products, whether that is food processing and restaurants or alternative production approaches that attract higher prices (e. g. , organic, locally produced, or the Label D'Or or Label Rouge approaches). Among the largest increases in the production of chicken meat in the top-producing countries were those in India (217%), China (67%), and Brazil (112%; One of the greatest percentage increases (136%) was achieved in Vietnam (from 0. 4 million metric tons in 1995 to 0. 32 million metric tons in 2005). The increase in chicken meat production in the United States was 38% over the 10-yr period. This is similar to that for the aggregate for Europe (30%, from 8. 75 million metric tons in 1995 to 11. 4 million metric tons in 2005) with, for instance, the Russian Federation exhibiting a 40% increase (going from 0. 69 million metric tons in 1995 to 0. 96 million metric tons in 2005). Globally, total egg production is 78% (by weight) of poultry meat production, with China being the major producing nation.

The importance of research of eggs and their production is likely to continue and become greater in the future, with a consequent increase in papers published in Poultry Science in support of this sector. Egg production is growing rapidly (39% over 10 yr) with Asian countries in particular having high rates of increase (e. g. , China and India with increases of 42 and 67%, respectively). Despite the increased concerns regarding welfare, the aggregate production of chicken eggs in Europe has increased by 6% from 9. 4 million metric tons in 1995 to 10. 0 million metric tons in 2005. There have been large increases in the production of both duck and goose meat, predominantly in China. It is not surprising, therefore, that there has been a marked increase in the numbers of publications in Poultry Science pertaining to research in these species.

Breeds Of Poultry

Advances in the process of selective breeding, mainly of chickens, have been made possible by advances in the science of breeding programmes and in the capacity of computing power available. More than 40 different traits are selected for in chickens includinghealthand welfare, and environmental esource efficiency, as well as productivity traits.

Variety:

- Variety is detected by feather color, heat crest or other physical characteristics within a breed. For example, white leghorn, black minorca etc. Strain: Strains are made for a certain purpose by internal insemination of at least five generation. For example, star cross white, star cross brown, star brow etc.
- Hybrid: Hybrid chickens are produced for increasing quality and production by inseminating with same or other breed strain. Hybrid chicken becomes more productive than their parents.
- Layer Hybrid: Layer hybrids are made for producing more eggs by inseminating with same or other selected breeds.
- Broiler: Broilers are 6-8 weeks of aged chicken weights between 2-2. 5 kg which are used for only meat production.

- Growing Chicken: Chickens aged between 9-20 weeks of age are called growing chicken.

Classification According to Origin:

According to origin the chicken are of four types.

- Asiatic: Brahma, longson, cochin, asil etc.
- English: Austrolorp, cornish, dorking, orpington etc.
- Mediterranian: Leghorn, minorca, ancona, fayoumi etc.
- American: Road island red, new hampshire, plymouth rock etc.

Classification On The Basis Of Production

On the basis of production chicken are of three types. Layer: Layer is for egg production. Some popular layer breeds are leghorn, minorca, ancona, fayoumi, isa brown, babycock, star cross, lohman etc. Broiler: Broiler chickens are only for meat production. Plymouth Rock, cornish, sussex, dorking, cochin, brahma, asil, star brow, hi-line etc are popular broiler breeds. Egg and Meat: This types of breed are used for the purpose of both egg and meat production. Road island red, new hampshire, plymouth rock etc. are popular breeds for both meat and egg production.

Some of the more popular breeds of chicken are the Single Comb White Leghorn, Sex-Link, Barred Plymouth Rock, Rhode Island Red and the New Hampshire Red. The White Leghorn breed lays white shelled eggs and is extensively used in commercial egg production throughout much of the United States. The Sex-Link is a brown egg layer and is found in New England, Southern California and scattered throughout the Southwest United States. Much of Europe and other countries use different varieties of both the Leghorn and Sex-Links for egg production. For the backyard, non-commercial flocks, the Barred Plymouth Rock, Rhode Island Red and New Hampshire Red, among others, are the preferred bird. These are classified as dual purpose birds, because they can be used for both egg production and meat production. They are heavier than the Leghorn or Sex-Link and withstand variations in temperature better.

The Role Of Poultry In The African Economy

The poultry industry is highly developed in South Africa and has seen a great deal of development in other African countries during the past two decades. Eggs and poultry meat are beginning to make a substantial contribution to relieving the protein insufficiency in many African countries. Sonaiya (1997) and Gueye (1998), however, reported that almost 80% of poultry production in Africa is found in the rural and peri-urban areas, where birds are raised in small numbers by the traditional extensive or semi-intensive, low-input–low-output systems. According to a study by Mcainsh et al. (2004), chickens are the most commonly kept livestock species in Zimbabwe.

Chicken production is divided into large-scale and smallholder chicken production. The smallholder production is mainly free-range systems. Women are the care takers and decision makers of most chicken flocks, and chicken meat is eaten more than any other meat. Adegbola (1988) reported that only 44 eggs were produced in the African continent per person per year. Per capita consumption of eggs and chicken meat has increased significantly in certain African countries, particularly where production has been rising, as one would expect.

For example, per capita egg consumption in South Africa went up from 89 eggs in 1990 to 107 eggs in 2005, and chicken meat consumption from 15. 5 kg in 1990 to 24. 7 kg in 2005 (Viljoen, 1991; FAOSTAT, 2005b). Chicken meat production in Africa as a whole went up from 1790 thousand tonnes in 1990 to 3189 thousand tons in 2005. The leading countries in chicken meat production in Africa are Algeria, Egypt, Morocco, Nigeria and South Africa (FAOSTAT, 2005a). There is very little statistical information on the industry from other African countries, with few exceptions.

In spite of the expansion that Nigeria has seen in its poultry meat industry, per capita consumption is still below 2. 0 kg (FAOSTAT, 2005b), as was reported by Ikpi and Akinwumi (1981). The Moroccan industry had undergone tremendous growth since the early 1980s, when per capita consumption was estimated at 50 eggs and 7. 6 kg of poultry meat (Benabdeljalil, 1983).

Risks Associated With Poultry Production

In the art of poultry farming, the introduction of pathogens, subsequent development of disease, and spread of pathogens to other farms has its own risk profile for every farm. This risk profile is determined by a complex interaction between the levels of infection in an area, the measures implemented on the farm to prevent disease, and other factors including the density of farms in the area and linkages with other farms and markets. There are complex interactions among poultry, disease agents, and theenvironment. Factors directed at specific or non-specific immunity of the birds can affect their ability to resist disease if exposure to the agent occurs.

Activities directed at the disease agents mainly influence the exposure of the birds to the agent.

Environmental factors can also affect both the birds and the disease agent.

Poultry Production Systems, Feeding And Nutrition

Historically, the poultry sector has evolved through three phases:

- traditional systems, which includefamilypoultry consisting of scavenging birds and backyard raising;
- small-scale semi-commercial systems; and
- Large-scale commercial systems. Each of these systems is based on a unique set of technologies.

They differ markedly in investment, type of birds used, husbandry level and inputs such as feeds. The feed resources, feeding and feed requirements required to raise poultry also vary widely, depending on the system used. The traditional system is the most common type of poultry production in most developing countries. Possible feed resources for the local birds raised in this system include:

- household wastes;
- materials from the environment (insects, worms, snails, greens, seeds, etc.);
- crop residues, fodders and water plants; and
- by-products from local small industrial units (cereal by-products, etc.).

The survival and growth of extensive poultry systems are determined by the competition for feed resources in villages. This system works well where biomass is abundant, but in areas with scarce natural resources and low rainfall, the competition for natural resources with other animals can be extreme. Between the two extremes of traditional and commercial production systems is the semi-commercial system, which is characterized by small to medium-sized flocks (50 to 500 birds) of local, crossbred or " improved" genotype stock, and the purchase of at least part of their feed from commercial compounders.

Several feeding strategies may be used in this system:

- on-farm mixing of complete rations, using purchased and locally available feed ingredients;
- dilution of purchased commercial feeds with local ingredients; and
- Blending of a purchased concentrate mixture with local ingredients or whole grains.

The large-scale commercial system is the dominant production system in developed countries, and this sector has also recently expanded in many developing countries. Commercial systems are characterized by large vertically integrated production units and use high-producing modern strains of birds.

In these systems, feed is the most important variable cost component, accounting for 65 to 70 percent of production costs. High productivity and efficiency depend on feeding nutritionally balanced feeds that are formulated to meet the birds' nutritional requirements. Most poultry species are omnivores; which in nutritional terms means that they have a simple digestive system with non-functional caeca. Exceptions to this general rule include geese and ostriches, which have well-developed functional caeca.

The digestive tract of poultry has more organs but is shorter than that of other domestic animals. The unique features of this digestive tract include the crop, which is a storage organ, and the gizzard, which is a grinding organ. In fast-growing meat chickens, it takes less than three hours for feed to pass from mouth to cloacae and for nutrients to be digested and absorbed. To compensate for the relatively short digestive tract and rapid digester transit time, high-performing birds need easily digested, nutrient-dense diets. Nutrient balance is critical.

The rates of genetic change in growth and feed efficiency over the years have also changed the physiology of the birds. Nutrient requirements and nutritional management have therefore changed to satisfy the genetic potential of the new strains. The high genetic potential of current poultry strains can only be achieved with properly formulated feeds that are protein- and energy- dense. Poultry, especially growing birds, are unique among domestic animals in that any change in nutrition is reflected in bird performance almost immediately.

This phenomenon has been successfully exploited by the commercial poultry industry to improve growth, carcass yield and egg production. The term “ poultry” encompasses a range of domesticated species, including chickens, turkeys, ducks, geese, game birds (such as quails and pheasants) and ratites (emus and ostriches). This overview does not discuss the nutrition of all these species, but focuses on chickens, which constitute more than 90 percent of the poultry market. However, the principles of nutritional management for chickens are generally applicable to other poultry species grown for meat and eggs.

Feed is probably the most important entity in the poultry industry that can expose the birds to a wide variety of factors through the gastrointestinal (GI) tract. Intake of exogenous feed is accompanied by rapid development of the GI tract and associated organs. The timing and form of nutrients available to chicks after hatch is critical for development of intestines. Early access to feed has been shown to stimulate growth and development of the intestinal tract and also enhance post hatch uptake of yolk by the small intestine (Uni et al. 1998; Geyra et al. , 2001; Noy and Sklan, 2001; Noy et al. , 2001; Potturi et al. , 2005). Birds show slower intestinal development and depressed performance when access to feed is delayed (Corless and Sell, 1999; Vieira and Moran, 1999; Geyra et al. , 2001; Bigot et al. , 2003; Maiorka et al. , 2003; Potturi et al. , 2005). Such lack of access to feed leads to adepressionin intestinal function and bird performance, which may not be overcome at later stage in life (Uni et al. , 1998; Geyra et al. , 2001; Bigot et al. , 2003; Potturi et al. , 2005).

Development of the GI tract may affect the immune status of the bird at early stage in life as it is also the largest immune organ in the body (Kraehenbuhl and Neutra, 1992). Thus, anything that affects the health of the gut will undoubtedly influence the animal as a whole and consequently alter its nutrient uptake and requirements. Diet has significant effect on the immune status as well as overall performance of poultry birds. This can be induced by the presence of soluble or insoluble Non-starch polysaccharides (NSPs) (Iji, 1999; Choct and Annison, 1992a, b; Bedford and Schulze, 1998; Almirall et al. 1995; Bustany, 1996; Choct et al. , 1996, 1999a, 1999b; Jorgensen et al. , 1996; Leeson et al. , 2000; Mathlouthi et al. , 2003; Wu et al. , 2004). Physical structure (Brunsgaard, 1998; Engberg et al. , 2004) and form (Hetland et al. , 2002; Yasar, 2003; Engberg et al. , 2004; Taylor and Jones, 2004; Bjerrum et al. , 2005) of the diet. Not only is the gut the major organ for nutrient digestion and absorption, it also functions as the first protective mechanism to exogenous pathogens which can colonize and/or enter the host cells and tissues (Mathew, 2001).

As previously stated, the gut is also the largest immunological organ in the body. Thus, it is often implied that a more robust gut will make a healthier animal, which, in turn, digests and utilizes nutrients more efficiently. This link between enzyme activities, gut weight and growth performance has been elucidated by Hetland and Svihus (2001) and Hetland et al. (2003). Invariably the various alternatives to AGP as well as means of enhancing performance in poultry while reducing economic losses due to enteric infections is directed majorly at the gut which functions for nutrient digestion and absorption as well as immunological organ.

Other feed additives such as probiotics, prebiotics and enzymes can modulate the gut micro-flora and performance of broiler chickens (Choct, 2009).

Feed Formulation

One of the most important roles of animal production is to provide high quality protein for human consumption, and to achieve this proposal animals should be fed correct proportions of high quality protein in the diets. Amino acids are key factors in animal nutrition since protocols used to evaluate protein quality are related to amino acid supply.

Poultry feed formulation was until recently based on the concept of crude protein, which frequently resulted in diets containing amino acid levels higher than the actual requirements of birds. Amino acid excess is poorly used by birds, as it must be reduced to nitrogen and then excreted as uric acid. Excessive protein levels in food not only result in higher formulation costs, but also affect bird performance. The commercial availability of synthetic amino acids has allowed nutritionists to formulate cheaper feeds that contain adequate levels of amino acids.

However, protein levels are still too high. Birds do not have a high crude protein requirement, but there should be sufficient protein to provide an adequate nitrogen supply for synthesis of non-essential amino acids. The formulation of diets with lower crude protein levels will become feasible as other synthetic amino acids become economically available. Poultry amino acid requirements are not easily assessed, as they are influenced by several factors.

Nutritionists must take into account such factors when formulating several diets to satisfy the requirements of different bird categories, as well as different nutritional standards. The concept of ideal protein has been developed recently and is defined as the balance of digestible amino acids needed to supply the absolute requirements of all amino acids needed for maintenance and production, with no excesses or deficiencies. A reference amino acid is chosen and the requirement of other amino acids is estimated as proportions of this one.

Lysine is used as the reference amino acid despite being the second mostly limiting amino acid in broiler feeding after methionine. The reason is that lysine is easier to analyze than methionine and cystine, and it is used exclusively in muscle protein synthesis and not involved in other metabolic routes, such as maintenance and feathering. Moreover, there is more information available on lysine requirement as compared to other amino acids (Baker & Chung, 1992). According to Pack (1995), diet formulation based on total amino acid basis is similar to diet formulation based on crude energy.

Crude protein with excessive amino acid levels (levels 50% higher than normal requirements) can still be used in poultry commercial diets with no effect on performance parameters. On the other hand, when diets are formulated with synthetic amino acids, which presumably are available for absorption, minor changes in levels may influence feed efficiency, and especially feed intake. The most important parameters to typify carcass quality are carcass yield, breast meat yield, and fat content in the carcass.

Breast meat yield is the carcass component with the highest economic value, if the bird is considered as a whole. During the production cycle, breast meat continuously increases as a percentage of body weight (Acar et al. , 1993; Fischer 1994). When any limitation in the amino acid supply in the diet is found, breast meat accretion will be the first site of protein synthesis to be affected. Interactions among amino acids in the diet must also be considered. A response to lysine deficiency is observed only if methionine is properly supplied, which shows the importance of a well-balanced amino acid profile.

Weight gain and breast meat yield in broilers slaughtered at 54 days of age were affected by an interaction between dietary lysine and threonine. High dietary levels of lysine limited performance if threonine levels were not considered (Kidd et al. , 1997). Few studies evaluated different formulation criteria based on digestible amino acids for broilers. It is important to emphasize that optimal amino acid profiles are very different when considering different objectives (Pack, 1995). Body proteins contain high lysine levels. Approximately two times higher than levels of sulfur amino acids and threonine.

However, feather proteins contain very low lysine, whereas sulfur amino acid levels are very high due to the presence of cystine. Likewise, methionine+cystine (met+cyst) and threonine maintenance requirements are much higher than lysine requirements. In order to determine the proportions of essential amino acids to lysine, the described profiles must be combined with protein accretion data in broilers. This study evaluated live performance and carcass yield of broilers fed diets based on digestible amino acids and formulated with different criteria during the period of 43 to 49 days of age.

Microbial Probiotics And Other Feed Supplements Probiotics

Probiotics are mono-or mixedcultureof living microorganisms, which induce beneficial effect on the host by improving the properties of the indigenous microflora (Ghadban, 2002). Killed bacterial cultures as well as bacterial metabolites have been included in the definition of probiotics (Reuter, 2001). A typical example of probiotics is Lactobacillus spp. Poultry feeds containing probiotic microbes are increasing being considered as feed supplement in poultry diets. Willis et al. 2011) reported that most medicinal mushrooms contain biologically active substances such as polysaccharides, glycoproteins and other macromolecules, which can serve as good dietary supplements and immuno-modulating agent. The preventive effect of probiotics against Salmonella has been reported (Pascual et al. , 2001). Probiotics have been reported to have favorable effects on performance (Santin et al. , 2001). The beneficial effect of probiotics is based on their ability to modify the gut microflora. This necessitates that the microorganisms reach the gut in a viable form.

The use of treatments such as coating and absorption into globuli has been reported to improve the stability of probiotics (Simon, 2005). The mode of action of probiotics includes; competitive exclusion (Jin et al. , 2000; Alexopoulos et al. , 2004; Berchieri et al. , 2006), microbial antagonism (Conway, 1996; Kelly and King, 2001; Walsh et al. , 2004; Mountzouris et al. , 2006) and immune modulation (Cebra, 1999; Perdigon et al. , 2001; Lan et al. , 2005). Several microorganisms have been considered or used as probiotics including fungi particularly mushroom and yeast, bacteria and mixed cultures comprising of various microbes.

Willis et al. (2008, 2009a, 2009b 2010a, 2010b, 2011) consistently used Fungi Myceliated Grains (FMG) colonized by the edible shiitake mushrooms, Lentinula edodes as probiotic for broiler chicken. Ogbe et al. (2009) used wild mushroom, Ganoderma lucidum for the treatment of Eimeria tenella infected chickens. Woo et al. (2006) used the probiotic yeast (Saccharomyces cerevisiae) and fungi (Aspergillus oryzae) for the control of pathogenic bacteria infection in chickens. Similarly, Lee et al. (2007a, b) used the probiotic yeast Saccharomyces boulardii for the treatment of Eimeria infected chickens.

Antibiotics:

this is intended to cover all antimicrobial agents administered orally, topically or parentally to animals to produce a curative or protective effect. It includes antibiotics produced by fermentation of live micro-organisms as well as chemically synthesized compounds with antibiotic activity such as sulphonamides, trimethoprim and quinolones. It does not include disinfectants and coccidiostats.

Antibiotic Resistance

Resistance to antibiotics existed even before antibiotics were used throughout the world. However, this intrinsic form of resistance is not a major source of concern for human and animal health.

The vast majority of drug-resistant organisms have instead emerged as a result of genetic changes, acquired through mutation or transfer of genetic material during the life of the micro-organisms, and subsequent selection processes. ? Acquired Resistance: mutational vs. transferable resistance Mutational resistance develops as a result of spontaneous mutation in a locus on the microbial chromosome that controls susceptibility to a given antibiotic. The presence of the drug serves as a selecting mechanism to suppress susceptible micro-organisms and promote the growth of resistant mutants.

Spontaneous mutations are transmissible vertically. Resistance can also develop as a result of transfer of genetic material between bacteria.

Plasmids, which are small extra-chromosal DNA molecules, transposons and integrons, which are short DNA sequences, can be transmitted both vertically and horizontally and can code for multi-resistance. It is estimated that the major part of acquired resistance is plasmid-mediated. ? Multiple Resistance Resistance depends on different mechanisms and more than one mechanism may operate for the same antibiotic.

Micro-organisms resistant to a certain antibiotic may also be resistant to other anti-biotics that share a mechanism of action or attachment. Such relationships, known as cross-resistance exist mainly between agents that are closely related chemically (e. g. polymyxin B and colistin, neomycin and kanamycin), but may also exist between unrelated chemicals (e. g. erythromycin-lincomycin). Micro-organisms may be resistant to several unrelated antibiotics. Use of one such anti-biotic will therefore also select for resistance to the other antibiotics.

Bio-security For The Poultry Industry

There has been tremendous growth in the global poultry industry over the past few decades. Some regions have reported a dramatic increase in the incidence of infectious disease outbreaks during this time of rapid expansion. In spite of the difficult challenges that the industry has been facing, poultry products (meat and eggs) still represent a major part of animal protein consumed by humans at the global level. Today's consumers are generally more health-conscious and react strongly to perceived safety issues associated with consumption of products of animal origin.

Mad cow disease (BSE), avian influenza (AI) and salmonellosis are just a few examples of these contemporary concerns. In these days where the media tend to create hype rather than reporting the news, it is even more important to maintain a continuous vigilance to keep consumer confidence in poultry products. Farm bio-security measures reduce, but do not eliminate, the risk of introduction or onward transmission of pathogens; they include factors such as the location of farms, the physical facilities, and the operational procedures implemented.

Investments in these measures are subject to the law of diminishing returns. The Food and Agriculture Organization of the United Nations (FAO) has defined four production systems based partly on the bio-security measures implemented. Distinguishing between farms on the basis of the measures practiced is important, as not all intensive poultry production units apply bio-security measures appropriate to the level of risk of virus incursion.

Experiences with highly pathogenic avian influenza viruses of the H5N1 subtype have shown that farms in all production systems have experienced outbreaks, of highly pathogenic avian influenza, and that it is not possible to blame one particular system for the genesis or spread of the disease. Nevertheless, farms that rear ducks outdoors or where poultry are sold through poorly regulated live poultry markets appear to be high-risk enterprises, especially in countries where infection is present.

Enhancement of bio-security measures is generally agreed to be the best way to minimize this risk, but not all farms are in a position to implement stringent bio-security, especially those that rely on rearing poultry outdoors. Formal risk analysis has rarely been applied to individual farms, but would assist in determining the benefits of existing and proposed on-farm bio-security measures and in highlighting gaps in our knowledge regarding the levels of hazard for farms.

Poultry Health Status

Signs of poor bio-security: torn shoe covers leaking drinkers and wet litter maintaining the excellent health of poultry flocks is the primary objective of any producer since a healthy flock is usually a profitable flock. Despite all progress in prevention and control of infectious diseases, it is still difficult to keep a commercial poultry facility disease free. Commercial poultry farms continue to be affected by the emergence of new or variant disease agents. Diseases are generally responsible for mortality and reduced growth rate and egg production in poultry flocks.

The end result of these diseases is reduced economic returns to producers. The emergence of new diseases and variants of existing diseases are becoming more common in the industry. Genetic changes in the microorganisms might have, in part, contributed to this situation. Similarly, genetic changes in the birds might have also altered their susceptibility or resistance to diseases. Global trading and traveling have made it difficult to keep diseases to limited areas or regions.

Current Situation

With the current tendency for regulatory agencies, in many parts of the world, to further limit the use of antibiotic growth promoters and therapeutic antibiotics, more effort must be directed to disease preventive strategies rather than use of pharmacologic treatments. There are different sources or methods that can introduce diseases into a farm or spread infections within or between farms. These include:

- Human (employees, visitors)
- Airborne transmission
- Carrier birds within a flock
- Birds in hospital/cull pen in a poultry house
- Birds recently obtained from an outside flock
- Forced-mounted hens Eggs from infected breeder flocks
- Backyard, pet fowl and wild birds
- Pet animals, rodents and insects
- Live-bird markets
- Contaminated feed and water and
- Contaminated vaccines.

More signs of poor bio-security: broken fans and build-up of dust mortality not promptly removed with the tendency for larger farms and with higher bird density, the above mentioned methods of disease spread can, directly or indirectly, contribute to dissemination of infectious agents. There could be severe losses following a disease outbreak or the emergence of a more pathogenic form of a given disease.

Sub-optimal performance due to a disease can result in economic losses although there are no exact estimates of losses associated with diseases. Specific factors such as the virulence of the agent, the immune status of the flock, previous exposure to immunosuppressive agents or conditions, housing design, stocking density, and environmental conditions are all variables that can influence the extent of losses following a disease outbreak.

Biosecurity, An Old Concept

Bio-security is a term frequently used in the poultry industry over the past decades.

Many people believe that bio-security only involves implementing a strict visitor control and farm cleaning programme. In reality, a comprehensive bio-security program includes many other components. In any commercial poultry operation, flock health must be excellent in order to achieve maximum profitability. Health status can often be directly correlated with the comprehensiveness of the bio-security programme implemented in an operation. It should also be noted that competence of the immune system of birds is of critical importance.

Bio-security is the efficient use of common sense hygiene procedures in preventing the adverse effects of a disease. It can be defined as a set of management practices which, when followed, reduce the potential for the introduction or spread of disease agents onto and across the site. In other words, bio-security is an essential component of a disease control programme in the poultry industry. Clearly, a bio-security plan must be adapted for each operation because each operation usually has its own unique situations. There is no standard formula applicable to all poultry commercial farms.

Comprehensive Bio-security Programme

When a disease outbreak occurs, people tend to point fingers at someone or something else as being responsible for introduction of the disease agent. This is definitely the wrong approach. Under these circumstances, everyone should make an effort to keep an open mind and to help investigate how the problem began in the first place. The objective is to solve the problem and not simply determine who was at fault. Problems need to be correctly diagnosed by all available means; otherwise they may recur in the next production cycle or on other farms within the company.

The worst excuses that are often heard during a disease outbreak are " Nobody told me that before" or " I did not know that". Thus, it is imperative that all employees at all levels have a complete understanding regarding the policy on the bio-security programme. It is recommended to make check-lists and ensure that training is on-going, even when times are good and no diseases are present. A bio-security programme should be applied with the same intensity to all sectors of a company. It must be practical and easily understood by everyone within the company. Complicated bio-security programmes, which are not easy to implement, will fail.

Consistency in following bio-security rules throughout the year, i. e. production cycle, is very important. Bio-security programme implementation comes at little cost when compared to the costs associated with a disease outbreak. Bio-security is a necessary expense and can make a difference between success andfailurein a poultry operation . A few examples are;

- Avian Influenza This disease has caused problems for birds and, in rare instances, humans. The disease is being found in more regions around the globe and is even endemic in the poultry industries in several countries. Outbreaks of avian influenza over the past 10 years indicate that current levels of bio-security in different parts of the world are inadequate to limit dissemination of this disease.

- Infectious Bursal Disease (ibd) IBD continues to be one of the most important diseases of poultry, with high rates of morbidity and mortality. This disease can be controlled by routine vaccination and a solid bio-security program. Inadequate control programs including bio-security measures will not only increase the risk of IBD but also open the door to many other diseases such as Marek's disease.
- Newcastle Disease And Infectious BronchitisNewcastle disease (NDV) continues as a major problem in different parts of the world. Protection of flocks against NDV requires a solid bio-security and vaccination program. In many intensive broiler and egg production regions, variants of infectious bronchitis virus (IBV) have emerged causing respiratory infections in broilers, decreased egg production and degraded shell quality in breeders and commercial layer flocks.

Housing

Buildings for all poultry must meet the following minimum conditions:

- Poultry houses must be structures with their own dedicated grazing, air space, ventilation, feed and water;
- at least one third of the floor area shall be solid, that is, not of slatted or of grid construction, and covered with a litter material such as straw, wood shavings, sand or turf;
- In poultry houses for laying hens, a sufficiently large part of the floor area available to the hens must be available for the collection of bird droppings;
- They must have perches of a size and number commensurate with the size of the group and of the birds as laid down in Annex VIII.

- they must have exit/entry pop-holes of a size adequate for the birds, and these pop-holes must have a combined length of at least 4 m per 100 m2 area of the house available to the birds;
- each poultry house must not contain more than: 4800 chickens; 3000 laying hens; 5200 guinea fowl; 4000 female Muscovy or Peking ducks or 3200 male Muscovy or Peking ducks or other ducks; 2500 geese or turkeys;
- The total usable area of poultry houses for meat production on any single production unit, must not exceed 1, 600 m2.

Types Of Housing

There are two main categories of housing organic poultry: static and mobile. The various types of housing that may be suitable for free-range and organic poultry systems are described by a number of authors, including Lampkin (1997), Thear (1990), Keeling (1989) and Wegner (1989). There has been little research on the relative welfare benefits of various housing systems (Hill, 1986).

Static Or Fixed Houses

Fixed house systems, in which relatively large numbers of birds can be kept, allow producers to keep up to the maximum of 4, 800 chickens, or 3000 laying hens (Defra, 2006). Such fixed housing systems do not lend themselves particularly well to integration with a whole farming system, although there are producers who are able to grow arable crops to support the poultry.

The main advantage of static housing for poultry is that it is easier to find automatic or semi-automatic solutions for the provision of feedstuffs, water and for the collection of eggs and droppings. The costs per bird are also likely to be lower (Lampkin, 1997). With regard to disease control, static houses provide difficulties in enabling a paddock system that reduces the risk of parasite burdens, particularly helminths. There are also risks involved in the buildup of mud around static houses, which may be carried into houses and cause contamination of birds and fittings (Lampkin, 1997). Static houses are normally either floor-based or aviary systems. Floor-based systems are frequently simply covered straw-yards. These systems are normally used for table-bird production.

Mobile Houses

There are basically two forms of mobile housing: those that are large and are moved between batches and the smaller ark-type houses that are moved more frequently. Ark type houses are limited by their size and are labour intensive. However, they do permit good disease control through frequent rotation. Mobile house systems naturally restrict group size, as there is a practical limit to the size of a house. Mobile systems, particularly on the larger scale, lend themselves more easily to integration into a whole farming system.

The two main issues facing the industry are questions of where to draw the line with regard to group size and the extent to which poultry units should be integrated into a genuine farming system. Both issues have complicated and debatable health management perceptions attached to them.

Building Design

Many of the potential problems that can createstressin alternative systems can be eliminated at the design stage. See Defra (2001) publication the welfare of hens in free- range systems. There are a number of good practice points to be considered in the design of buildings for poultry:

- Provision of dry, friable litter.
- Birds should not need to walk more than 3m to find water and food. Avoidance of key areas that can be patrolled by bullies.
- No draughts.
- No shafts of light should enter the building.
- Dark areas to be avoided except for nest boxes.
- Vermin-control. Although provision of vermin proof conditions is desirable, this is not really possible to implement under free-range conditions.
- Adherence to housing standards.
- In fixed house situations, either wire mesh or stones in areas immediately outside popholes.
- Finally and most importantly, air quality (i. e. low ammonia levels, correct humidity, correct temperature and good ventilation) plays a crucial role in health management.

The position of a house can influence ranging activity and bird health. Soil type and drainage are instrumental in determining the extent of build up of soil-borne parasites. Defra (2001) highlight the following points with regard to sitting of free-range poultry houses, and in particular static houses:

- Locating houses on free draining, south facing pasture is preferable in order to minimise the build up of internal parasites and coocidial oocysts and to ensure better retention of grass cover.

- Ideally, houses should be positioned in the centre of the land area so that a series of radiating paddocks can be created around the unit, although this will depend on power and water supplies and subject to local planning constraints. Sitting houses at right angles to the prevailing wind slightly moderates the amount of wind entering the building through the popholes.
- Accessibility during all weather conditions is an important consideration
- Range areas bordered by dense woodland are likely to be at greater risk from predation by foxes in particular.

Litter Management

Litter management is a vital component of managing the welfare of birds as ammonia release from poor litter can lead to conditions such as breast blister, hock burn, pododermatitis and respiratory disease (FAI, 2005). Management of litter in free range systems presents problems, particularly in winter when the weather is cold and litter is likely to become wet.

In the MAFF publication Poultry Litter Management (1999), three factors are highlighted that have particularly important effects on litter condition: litter moisture, greasy capped litter (resulting from too much fat in the feed or feed of poor quality); and nitrogen in the litter. Several diseases and conditions are known to be associated with poor litter, including malabsorption syndrome, infectious bursal disease, bacterial infections, burnt hocks and pododermatitis. Stocking density, water provision, depth of litter, type of litter, ventilation, condensation and feed quality are all associated with litter quality. Mouldy litter should not be used (MAFF Codes of Recommendation for the Welfare of Domestic Fowl, 1999).

Perches

The provision of perches for laying birds satisfies a natural behavioral activity. However, if badly designed, these can result in pain and injury. Perches should be arranged so as to enable birds to easily move between them and other equipment, thus reducing the risk of collisions and subsequent bruising and/or other damage. Consideration should be given to minimizing bird stress and downgrading during catching at the end of the laying period. The ability to remove perches aids this process (Defra, 2001). Scott and Parker (1994) showed that there is an apparent threshold, at around 1. 00m, beyond which birds have difficulty in moving from perch to perch.

To minimize the risk of injury, Scott et al (1997) recommend that the angle between perches at different heights should be no more than 450, and the horizontal and vertical distances between these perches minimized, to allow the birds to be able to move downwards easily. Perches should not be used for table bird as their use may result in twisted and deformed bones. Studies on organic systems show that in some broiler strains access to perches may increase the occurrence of breast blisters, but significant strain differences in the occurrence of breast blisters are also found independent of perch use (Nielsen, 2003).

Injury

Physical injury as a consequence of building design is an important welfare consideration. EU organic standards require a minimum perch area of 18cm per bird. There are no requirements concerning the distance between perches. Scott and Parker (1994) showed that the spacing of perches in a perchery-style house can be critical in avoiding injury. See also The Five Freedoms: Freedom from pain, injury and disease

Ventilation

EU Regulation 1804/1999 (Annex IB, section 8. 1. 1) general principles for livestock housing state that: " Insulation, heating and ventilation of the building must ensure that air circulation, dust levels, temperature, relative humidity and gas concentration are kept within limits which are not harmful to animals.

The building must permit plentiful natural ventilation and light to enter". Heat stress in poultry houses can be a problem, and is associated with stocking densities and ventilation. Although organic standards specify low stocking densities, conditions that promote huddling, such as poorly ventilated buildings, can still result in stress, injury and, in extreme circumstances, death. The negative effects of high and low temperatures can be minimized by appropriate housing design, ventilation and feeding (Seeman, 1989). The use of ceiling fans during periods of hot weather can be a solution to heat stress and lead to a reduction in ammonia levels (Gavaret, 1991).

A ventilation system needs to provide uniform, draught free, distribution of air, either using natural forces or through powered fans, so as to ensure air change rate is adequate for the removal of bird heat during hot weather (maximum ventilation rate) and to remove stale, smelly air curtains can be lowered to provide natural ventilation. and humidity during cold weather (minimum ventilation rate) (Defra, 2001). Good ventilation needs to be complemented by good building insulation. Raised popholes can help in reducing the impact of climatic extremes on the temperature within the house. Defra (2005) have produced advisory material on solving heat stress in poultry.

In summary, a number of points related to heat stress are recommended; although the relevance of these to organic producers will be depend on the housing system:

- Provide adequate ventilation for the number of birds housed.
- Provide fast air speed over birds.
- High humidity increases the likelihood of heat stress in hot weather.
- Where possible, reduce stocking densities during hot weather both in
- The shed and during transport.
- Regularly maintain and test alarms and emergency ventilation equipment.
- Make contingency plans in advance so all know their respective roles
- And ensure that someone is available with authority to take actions. Various methods of providing ventilation, both artificial and natural, are described by Sainsbury (1993) in " The Health of Poultry" by Pattison (1993).

Defra (2001) the welfare of hens in free- range systems provides guidance on ventilation rates.

Lighting

In the case of laying hens, natural light may be supplemented by artificial means to provide a maximum of 16 hours of light per day (EU Regulation

1804/1999: Annex IB, section 8. 4. 4). A continuous period of 8 hours of nocturnal rest without artificial light is required. Lighting regimes for table birds are not specified. The major difference in performance of chickens housed with and without artificial environmental controls, such as heating, is in feed consumption, particularly during winter (Keeling et al, 1988, Gibson et al, 1984).

Disruption of a lighting regime can cause serious harm to flock development. All lighting programs used with commercial flocks use the principles of decreasing light stimulation for growing pullets and increasing light stimulation after the pullets have reached a mature production age. Light is a very strong stimulating factor in poultry and must be carefully managed. A general rule of thumb is that pullets should never be subjected to increasing artificial light and layers never subjected to decreasing artificial light. Until the pullets are three weeks old, they should be given 20 to 24 hours of light daily. Gradual changes in artificial lighting are recommended.

As well as length of lighting, light intensity is also an important consideration. The provision of light to point of lay and laying birds will depend on season. Thear (1990) recommends that lighting is not needed at all for free-range birds approaching point of lay in spring, and any free-range flock over 34 weeks of age by 13 April should receive natural progression of light to Midsummer Day (21 June). After this date, they should be receiving 16 hours of light per day.

Nest Boxes

To reduce the impact of excessive aggression within a flock, and to avoid floor laying and wastage, it is important that sufficient nest boxes are available.

The provision of perches and of ground-level nest boxes will also encourage the use of nest boxes amongst a greater proportion of hens (Appleby et al, 1986). It is important that nest boxes are sufficiently accessible so that they can be easily cleaned between batches.

Effect Of Climate Change On Poultry Production

The varying temperature, high humidity, excessive heat, rainfall which is as a result ofclimate changehas affected poultry birds in terms of egg production, body weight, health, diseases, income of the farmers, diet of the people, the quality, the quantity of poultry products and the economy of Nigeria at large(avila, 1985).

The climatic factors affecting poultry productivity are; Varying high temperature, high rainfall, high humidity and depressive environmental heat.

- High temperature: this is a situation whereby the degree of hotness is higher than the normal temperature
- High rainfall: this is the situation whereby there is increase in the percentage of rainfall that is normally experienced in a place.
- High relative humidity: this is the level of moisture content in the environment.
- Depressive environmental heat: this is the heat that is caused by factors such as human activities, heat from sunshine due to the depletion of the ozone layer (essential geography).

Poultry production is highly affected by high temperature which is one of the factors listed above; it reduces the ability of poultry birds to feed properly which lead to loss of body weight, high body temperature thereby reducing the rate of growth of poultry birds. As a result of this, the market price of the poultry birds will be low which a minus on the part of the farmer is. (Mowbray and skyes, 1971) Moreso, high temperatures also has its effect on egg production in terms of quality and quantity. Egg is a good source of protein and raw material for cosmetics and vaccine industries. According to Charles; Feed intake of a laying bird decrease by 1. 5g a day for every degree rise in temperature about 30 degree high decrease egg production by about one egg per bird in a year for every degree rise in temperature. Charles, 1980 Furthermore, the content of moisture in the environment i. the humidity is also a major threat to poultry production and survival. According to kekocha, 1985, he said that ‘ humidity above 70% will cause reduction in egg layering. More so the depressive effect of environmental heat stress increases the rate at which poultry bird consumes water and as a result of this it reduces the shell thickness (kekocha, 1985). It is vivid that most of the egg we see today have very thin egg shell. Apart from the thin egg shells this depressive environment heat stress also leads to high death rate, thereby reducing the population of poultry birds (kekeocha 1985), (poultry production hand books London macmillian publishers (Ltd).

In addition, rainfall help to provide large quantity of feed for the poultry bird but the excess of rainfall leads to high moisture content of the environment and as a result of this, diseases can be spread and invariably the high moisture provide a comfortable atmosphere for breeding of disease parasite

“ the common diseases in this rain month are coccidiosis fowl cholera and ascaris a worm (endoparasite) diseases” (permin