

Aquaculture and Poultry Industry, Useful Learned Lessons

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Abstract: The historical development of aquaculture and poultry industry in Egypt was reviewed starting from the 60's of the 20th century up to 2011. Several and different stages of historical development for both sectors were described starting from the late 70's of the 20th century until the year 2011. Production figures, market prices, advantages and disadvantages of poultry industry compared with aquaculture were discussed. Many useful practices applied in poultry industry and could be applied also in aquaculture were highlighted. On the other hand, disadvantages, catastrophes and abusive practices of poultry industry that should be avoided in aquaculture were demonstrated.

Key words: Aquaculture, poultry industry, Egypt, historical development, market prices, production

INTRODUCTION

Historically, fish culture in Egypt goes back to the earliest of civilization on the Nile. However, the preliminary scientific approach to fish farming didn't take place before mid 1930s. Present aquaculture has begun to expand noticeably in the 1960s-1970s where scientific bases for aquaculture development were practiced. Background information as well as aquaculture development were reviewed by Eisawy and El-Bolock (1976), Sadek (1989), Shelton (1989), Torrans (1992), FAO (1994, 1996), AERI (1995) and El-Gamal (2006). Most of the utilized areas for aquaculture are located in the Northern delta governorates. There also exists some vast area of waste lands in the governorates of Upper Egypt (Hamza, 1989). Aquaculture still requires more research (El-Gamal, 1997) to settle down and become well-established. Thus, aquaculture can benefit from the well-established poultry industry.

In the late 80's and precisely in the late 1988, some governmental authorities together with the private sector started the manufacturing of specialized fish feeds for the first time. The General Authority for Fish Resources Development (GAFRD) has established 2 factories for fish feeds in Barcieq (started its actual production in 1990) and in Manzalah fish farms and so did the general authority for wheat and rice mills as well as some private factories which added production lines specialized in producing fish feeds to their factories. In 2001, a great progress has taken place in the field of manufacturing specialized fish feeds in Egypt after using the extrusion technology (Osman and El-Dien, 2004). Animal feeds' industry in Egypt depends on the importation of most of their

ingredients from abroad. These raw materials are mainly yellow corn, soya bean cake, fish powder and oil. Prices of those materials are affected by several factors including differences of the price of US\$ against L.E. due to freeing the price of the Egyptian pound in the year 2003 resulting in a great increase in the prices of raw materials. The average price of yellow corn increased from 420 in 1992 until reached 1100 L.E. per ton in 2003 (2.5 folds in 10 years). While the average price of soya bean cake 44% increased from 700 in 1992 to reach 2300 L.E. ton⁻¹ in 2003 (3 folds). The highest increase was in the average price of fish powder (300%) which increased from 1000 in 1992 to 4250 L.E. in 2003. Beside the increase in world prices of the raw materials due to monopoly by some countries and natural disasters that had taken place in other countries such as floods in China and drought in Europe in the year 2003. Eventually, all of these factors took part in enhancing prices of fish feeds where tilapia feed (25% protein) increased from 800 in 1992 to be doubled and reach 1600 L.E. in 2003 (Osman and El-Dien, 2004).

In the 7 years between 1995 and 2002, a marked decrease in average prices of all grades of tilapia occurred. This may be attributed to the misdistribution of fish production where fish harvest of all fish farms is carried out in November and December only leading to increase in fish supply during this period with the resulting inevitable decrease in fish market prices (Osman and El-Dien, 2004). Poultry industry has been established in 1964 after issuing a presidential decree to establish the general corporation of poultry. Then, poultry industry has developed rapidly in mid seventies but randomly and the number of poultry farms reached 400 farms in 1974. Due to the great governmental support for this industry which

reached its maximum between 1978 and 1982, a great flourishing of this sector took place from late seventies until mid eighties. This support was in the form of very low rate of interest on credits (only 6%), giving licenses very easily for farmers and investors to build poultry farms, subsidization of elements of production as yellow corn or feeds generally and even for cement and iron needed for building farms (these elements were sold in 1/3 of their prices to poultry farmers) beside taxes' exemptions for 5 years and more. This attracted many investors to enter this sector without a proper coordination between different cycles of this industry and in absence or lack of information about market fluctuations and the actual market demand for poultry. As a result of this rush of investors to the industry, poultry production of broilers reached in 1985-305 millions from the industrial sector and to 60 millions of broilers from the rural sector where the number of poultry farms reached in the same year to 20 thousands farms with a total capacity of 500 millions of broilers per year (Selim, 1993).

Governmental legislations that regulate poultry industry were issued starting from 1982 where a ministerial decree was issued in 6/2/1982 to ban licenses for constructing new poultry farms or new factories of poultry feeds. Another ministerial decree was issued in 1986 to stop the importation of broilers' 1 day old chicks. This decree was followed with the decree number 1350 in 1988 which prohibited the importation of fertilized egg resulting in the settlement of poultry industry to a great extent. The governmental subsidization and taxes' exemptions were called off in mid eighties and interest rates were returned to their normal commercial levels. As a result, budgets of poultry farms and companies were badly affected causing the stoppage of nearly half of their capacities or even complete stoppage of many farms. It is worthy here to mention that poultry industry was subjected recently to great economic crises which directly affected the producers. Those producers believed that this could be attributed mainly to the great supply in certain periods leading to lowering of market prices and subsequently decreasing their net profits. Moreover, the industry was subjected to shortage of poultry feeds due to shortage in market supply of yellow corn and the great soaring of its prices (Selim, 1993).

Average price per ton of broiler's feed increased from 211 L.E. in 1981-291 L.E. in 1986 and then to 526 L.E. in 1988. It is worthy to mention that during 1987, average price per ton of broilers' feed soared from 306-350, 407 and 423 L.E. in the same year (increased with a percentage of 54%) (Shalaby, 1989). This continuous soaring of prices of poultry feeds during 1987 and 1988 was attributed to the increment imposed by the government on the price per

ton of imported yellow corn (constitutes 65% of poultry feeds) which increased from 30 L.E. in 1971 to 60 L.E. in 1978, 120 L.E. in 1986, 180 L.E. in 1/7/1987, 220 L.E. in 24/1/1988, 250 L.E. in 26/4/1988 and to 300 L.E. in 1/6/1988 (Mousa, 1984; Shalaby, 1989). The governmental subsidization of yellow corn was called off completely in 20/6/1988. Since, that time, the prices of yellow corn became free and detected according to actual market prices to pursue their soaring to make the average price per ton of broilers' starter feed ranged from 700-800 L.E. ton⁻¹ during the era of nineties which showed a relative sort of stability in the prices of animal feeds.

In the last third of the year 2000, the price of US dollar against the Egyptian pound started to increase markedly to reach 3.85 L.E. and continued its increase to reach 4.06 and 4.65 L.E. in 2001 and 2002, respectively. Then, it soared to reach 6 L.E. in the year 2003 after freeing the price of the Egyptian pound by the Egyptian government and exceeded to 6.17 L.E. in the year 2004 (Osman and El-Dien, 2004). That was coincided with a sharp increase in poultry and animal feeds in general where the average price per ton of broilers' starter feed exceeded 900 then 1000 L.E. in the 1st 2 years of the 3rd millennium while the sharpest soaring took place in the year 2003 and 2004 when the average price exceeded 1500 L.E. ton⁻¹ until settled down to 1500 L.E. in 2005 and 2006 as the price of US\$ against the Egyptian currency settled down to nearly 5.75 L.E.

Major economic problems of poultry production in Egypt were mainly lack of parent stock, poor feed quality control, low feed efficiency, lack of optimum farm size and shortage of marketing infrastructure (Soliman, 1990). Modern livestock production has lowered the cost of production by integrating new production and management technologies. Successful operations tend to be growing in capacity are system-oriented, maintain high throughput, keep accurate records use outside consultants and control production costs. In order for producers to be successful in the future, access to technology, capital and timely information will be critical. Animal scientists have many common objectives with livestock industries. Their work in research, teaching and extension is critical for continued progress. However, people in the industries sometimes have the perception that academic arrogance, discipline myopia, uncoordinated research, slow technology transfer, increasing research costs and counter-productive tenure systems prevent animal scientists from being as relevant and responsive as they could be. Support from the industries is essential as animal scientists and academic departments seek political and funding support. This support can be attained by including integrated systems

research, improving communication skills, achieving more efficient research budgets, rapidly publishing results reducing the cost of information distribution, developing flexible research agendas, retraining scientists, acquiring modern methods and emphasizing critical thinking, communication and team work when teaching (Meeker, 1999).

HISTORICAL DEVELOPMENT OF MODERN AQUACULTURE IN EGYPT

Modern aquaculture in Egypt could be divided historically according to amount of investments, fish production and distinguishable economic features with an emphasis on prices of fish and their feeds, into the following stages:

The first stage (from late seventies to early 80's): Modern aquaculture could be linked with the establishment of numerous governmental fish hatcheries in the seventies of the 20th century where their construction started from late 70's and was completed on early 1980s. Besides, the introduction of more carp species rather than common carp was conducted between 1970 and 1980 where grass carp was introduced on 1977 from Holland for weed control. Since, that time the contribution of carp species to aquaculture was significant (El-Gamal, 1997). On the other hand, the Egyptian government signed an agreement in 1978 with the United States Agency for International Development (USAID) to establish a National Aquaculture Center in Egypt in order to provide leadership in research, training and extension in applied aquaculture. A presidential decree number 70 for 1979 was issued to confirm approval of the agreement. Abbassa was chosen as the site for the national aquaculture center because of its strategic location. The construction began in 1981. Fish production due to aquaculture reached at the end of this stage in 1985 to 38.000 tons (15.5% of total fish production in Egypt in 1985 which reached 246.000 tons). The public awareness has increased towards the investment in the sector of aquaculture in the mid 80's (Osman and El-Dien, 2004).

The second stage (from 1986-1996): This stage was characterized by: successful construction of some governmental fish farms on modern scientific bases. There were about 13.000 feddans of governmental fish farms (before 1989) on different sites of Egypt, ranging from 1.000-2.000 feddans, at various stages of operation or construction (Hamza, 1989). An obvious example was finishing the construction of the national aquaculture center at Abbassa with an area of 1200 acres of fish

ponds. This center was inaugurated in 1986. After that it joined the Egyptian Agricultural Research Center (ARC) in 1991 to be firmly established as national most important center for aquaculture research where it became known as the Central Laboratory for Aquaculture Research (CLAR). The presence of very few private fish farms. However, the private sector started to expand in that stage (Hamza, 1989). The most common cultured fish species beside tilapias were common carp, silver carp and grass carp where their seeds were available in large numbers in the governmental hatcheries of GAFRD. Tilapia seeds were still unsatisfactory for aquaculture. Fish production through aquaculture reached 44.000 tons in 1986 then increased to 55.000 tons in 1987 and 1988 then to 67.000 tons in 1989 after that it decreased to reach 60.000 tons during the 3 years from 1990 until 1992.

Cultured fish production continued its reduction to reach 54.000 and 53.000 tons in 1992 and 1993, respectively. Starting from 1995, a marked increase in cultured fish production was recorded as 61.700 tons which represented 15% of total fish production in Egypt during 1995 (407.000 tons). Finally it significantly increased at the end of this stage in 1996 to reach 75.900 tons representing 17.6% of total fish production in Egypt in this year (432.000 ton). Continuous but gradual increase in prices of feeds coincided with the increasing world prices of yellow corn, especially after lifting the governmental subsidization on the yellow corn in 1988. The Egyptian consumer demonstrated low acceptance for buying and eating different carp species because of their high fat content and the presence of numerous minute bones (or spines) embedded in between muscle fibers.

The third stage (from 1997-2002): This stage could be considered the golden era and the stage of flourishing of aquaculture in Egypt where it was characterized by: fish farming was primarily distributed within the delta where governmental and private fish farms was existed (El-Gamal, 1997). Private fish farms were mainly distributed in Kafr El-Sheikh, Sharkia, Damietta, Behera, Port Said, Ismailia and Fayium governorates. Cultured fish production from these private fish farms reached in 1998 to 47.212, 19.025, 17.125, 9.139, 4.600, 4.328 and 2.700 tons in those governorates, respectively. Launching of the Multiple Sector Support Program (MSSP) in 1997 which was a credit program provided by the European union. This program supported 4 main sectors in Egypt which were aquaculture, poultry industry, horticulture and irrigation systems. This support was carried out by providing grand credits (up to 5 millions L.E.) to farmers and investors to construct or develop a fish farm or a fish hatchery. As a result more than eighty fish farms and

hatcheries were established. Technical support and extension were also provided by the program. Many training courses were held in the facilities of the WorldFish Centre at Abbassa and financed by the MSSP to train technicians and fish farmers who received the credits of the MSSP. Privatization of large areas of governmental fish farms, especially at Abbassa where many ponds were rented to investors (some of them are owners of factories for manufacturing of fish feeds) and fish farmers.

This privatization helped in utilizing the previously neglected ponds converting them into highly productive ponds. The worldFish Centre was granted about 300 acres of fish ponds at Abbassa too and this helped in a more proper utilization of the neglected ponds. The use of the androgenic hormone (17- α methyl testosterone) in sex reversal of tilapia to produce monosex or all male tilapia in fish hatcheries. Those sex-reversed seeds of tilapia had a greatly faster growth rate than the ordinary seeds resulting in a marked increase in fish production from cultured tilapia. Later on, fish farmers started to abusively add sex hormones to the fish feed as growth promoters in the private fish farms exactly as what happened in the sector of poultry industry. A significant increase in fish production and flourishing of aquaculture were distinct and sensible in that stage as a result of the above mentioned factors. The cultured fish production in Egypt jumped from 73.454 tons in 1997 to 128.489 tons in 1998 then to 213.887, 356.468, 343.064 and 376.296 tons in 1999, 2000, 2001 and 2002, respectively.

Market prices of fish (mainly tilapia) decreased markedly in 1999 (9.2 L.E. for Grade I tilapia), 2000 and 2001 then sharply in 2002 (7.7 L.E. for Grade I tilapia according to GAFRD due to the greatly increased supply of fish. At the same time, prices of fish feeds were still increasing. Tilapia feed (25% protein) increased from 975 L.E. ton⁻¹ in 1997 to reach 1200 L.E. ton⁻¹ in 2002 (Osman and El-Dien, 2004). As a consequence, net profits of fish farmers got lowered. The abusive addition of sex hormones with fish feed began to attract the attention of the public or consumers who became more cautious. This public awareness sent an alarm to the governmental authorities and drew the attention of the decision makers to the danger of such abuses.

The fourth stage (from 2003-2006): The most characteristic features of this stage were: banning the use of 17- α methyl testosterone completely either for growth promotion or even for sex reversal of fish by the Egyptian people's assembly in 2004. However, the hormone was still used illegally in the private fish farms and hatcheries for sex reversal. Marked increase in fish production of fish

farms which reached 445.181 and 471.500 tons in 2003 and 2004, respectively despite of hormone prohibition. Prices of fish feeds showed sudden and enormous increase to reach 1600 L.E. ton⁻¹ in 2003 after freeing the price of the Egyptian pound. The average price per ton exceeded 1750 L.E. in 2006 for tilapia feed (25% protein). Market prices of fish remained stable in 2003 but increased in 2004 (8.49 L.E. for Grade I tilapia) where there was a reasonable profitability but not as high as profits gained in the first stage.

Fish prices started to soar on February 2006 once the Egyptian government declared the appearance of first cases of fowl influenza in Egypt and banned the manipulation of live poultry. Besides, there was a phobia of eating poultry meats by the public as they were panic of being infected with fowl influenza. What a coincidence that the Foot and Mouth Disease (FMD) was prevailing also at the same time among cattle and sheep. Nevertheless, FMD didn't have a negative impact on the consumption of red meat by the consumers like what fowl influenza did with poultry.

The fifth stage (from 2007-2011): Aquaculture is currently the largest single source of fish supply in Egypt accounting for almost 65% of the total fish production of the country with over 99% produced from privately owned farms. The development and expansion of modern aquaculture began in Egypt two decades ago following which the sector has witnessed a significant and rapid development over the last few years leading to a sharp increase in production. This sector is exhibiting the strongest growth of any fisheries related activity in the country and as a result aquaculture is considered as the only viable option for reducing the gap between production and consumption of fish in Egypt. Except for a very limited number of isolated instances, most aquaculture activities are located in the Nile Delta region. Aquaculture is practiced using a variety of systems with varying levels of technology. So far the majority of farmed fish are either freshwater species or those that can grow in brackish water.

The production of fish and crustaceans in marine or brackish water is still in its early stages and its development is still influenced by technical and economical problems. The majority of fish farms in Egypt can be classified as semi-intensive brackish water pond farms this type of farming suffered a dramatic reduction in numbers during the early 1990s as a result of the competition for land and water from the expansion of land reclamation activities for agriculture. Intensive aquaculture in earthen ponds and tanks is now developing rapidly to counter act the reduction in the

total area available for aquaculture activity. Current developments in production are centered on the application of modern technologies and are a result of changes in the structure of the fish farming community. The high rate of return on investment in aquaculture has attracted a large number of small to middle level investors who tend to have a more scientific background than the traditional farmers. The sector is becoming more sophisticated and diverse and this is also associated with a rapid expansion in support activities such as local feed mills and hatcheries. The number of fish hatcheries has increased from 14 in 1998 (Barrania *et al.*, 1999) to >300. About >6 fish feed manufacturing companies have been established during the course of the last 10 years (FAO, 2003).

HISTORICAL DEVELOPMENT OF POULTRY INDUSTRY IN EGYPT

Poultry industry has been developed greatly in Egypt in the late seventies. Since, that time, it passed by many different stages which could be distinguished according to amount of investments, poultry production, characteristic economic aspects and disasters with a special concern to prices of poultry and their feeds. The stages were divided as follows:

The first stage (in the late 70's of the 20th century): This was an initial stage of flourishing. It could be considered as the golden era of poultry industry where poultry farmers gained excellent profits. This might be attributed to the perfect conditions of this new enterprise at that time. Most importantly, those conditions included: the availability of pure and healthy imported breeds of chicks of high growth rate and excellent genetic traits. Cheap poultry feeds due to the governmental subsidization on the imported yellow corn. The presence of a relatively few number of poultry farms in Egypt at this stage. Thus, the market supply was not too high compared with demand resulting in profitable prices of chickens according to the law of supply and demand. The presence of a virgin environment free from fatal and infectious diseases which were introduced later on through the uncontrolled diversification in sources of importation of unhealthy breeds of chicks or brood stock. Absence of abusive practices in poultry farms such as the use of feminine sex hormones as growth promoters especially those used in human contraception. A fair acceptance of the Egyptian consumers to the produced chickens although, still with caution. This was also supported by the fact that there were no negative impressions of the consumers concerning the hazardous effects of eating chickens produced from poultry farms.

The second stage (in the early 80's): This stage was characterized by: the great increase in poultry farms due to the rush of many farmers and investors into the new profitable industry to take a share in the high profits obtained during the initial stage. Researchers can call this period the first rush stage of poultry farmers. The market supply of chicken meat increased greatly due to that rush leading to lowering market prices and profits of poultry farmers. Unfortunately, many abusive practices started to appear on the ground. The most dangerous abuse was the use of feminine sex hormones with poultry feeds as growth promoters. The female sex hormones used in human contraception were especially used by farmers due to their cheap prices as they were financially supported by the Egyptian government through its national program to face overpopulation. Another abusive practice was the excessive use of antibiotics and chemicals in controlling poultry diseases. As a result, the acceptance of consumers began to decline decreasing the market demand for chickens and finally sharing in lowering the market prices. During that stage, many national companies have erupted and entered the field of production of brooders, chicks and poultry feeds. The prices of poultry feeds started to increase gradually in this stage.

The third stage (in the late 80's): This stage was characterized by a devastating effect on the newly developed poultry industry where the market prices of chickens were decreased greatly and the poultry farmers suffered from severe losses and many of them stopped their activity, especially the small scale poultry farmers. This could be attributed to 3 main causes: a significant decrease in demand due to the refusal of consumers to buy chickens raised in farms. The consumers got panicked of being diseased with renal failure if they ate the foreign breeds (white chickens) fed on rations mixed with sex hormones, antibiotics and harmful chemicals. The increase in market supply of chicken which started in the second stage. This increased supply together with the decreased demand led to severe decline in market prices of chickens. The continuous soaring in prices of poultry feeds after calling of governmental subsidization on yellow corn on 20/6/1988.

The fourth stage (in the early 90's): This stage was characterized by: the poultry farmers began to give up the abusive practices, especially the use of sex hormones with poultry feeds. The Egyptian consumers began gradually to return back to buy and eat the foreign breeds or white chickens but they were still cautious. The poultry farmers started to recover again and to overcome this catastrophe. The appearance of poultry farms which started to rear

native breeds of chickens. At the same time, some farms shifted from raising foreign breeds to native breeds.

The fifth stage (in the late 90's until 1998): This stage was characterized by: the relative settlement in both supply and demand and subsequently in market prices of chickens. Thus, high profits were gained regularly by poultry farmers during that stage. These high profits attracted more investors and even ordinary people to rush into this sector again in what we can call the 2nd rush stage of poultry farmers. More increase in the number of poultry farms that raise native breeds. This was coincided and supported with the eruption or development of new and improved hybrids of native breeds. This flourishing of native chickens' sector could be attributed to the following reasons: to fulfill the increasing demand of a big sector of the Egyptian public who still prefer eating native chickens rather than foreign ones, especially due to the aforementioned abusive practices.

The high acquaintance of native breeds to the Egyptian environment especially their high tolerance to the high temperature during Summer in Egypt unlike foreign breeds. The high resistance of native chickens to diseases except to Gumboro. This disease is caused by a highly virulent virus which badly affects native chickens. The low cost of production for native breeds whose chicks have lower prices than foreign chicks. Besides, they consume lower quantities of feed than foreign breeds. The shorter production cycles of native breeds than foreign ones where they can be sold after 2 or 3 weeks for the house ladies for further raising. The prevalence of low quality and unhealthy breeds of brooders and chicks due to: banning of importation of brooders and chicks.

A marked increase in the number of national companies for production of brooders, chicks and feeds. Many of which were not stuck with the sound hygienic measures. Moreover, many of the large-scale poultry farmers intruded themselves in the field of production of brooders and selling the fertilized egg to accredit and unhygienic hatcheries or hatch the egg in their own incubators. The appearance and prevalence of what we can call house-hold production units. Those units were mainly conducted by youth who utilized bad rooms or any empty space in their houses to raise both native and foreign breeds of chickens. This phenomenon appeared due to the high profits of poultry farms in this period and because of the increasing problem of unemployment of youth in Egypt in the nineties. A relative stability in prices of poultry feeds which showed a slight and gradual increase.

The sixth stage (from 1999 until 2000): The sudden decline of poultry industry was the characteristic feature of this stage. This sharp decline could be attributed to: the continuous but gradual increase in prices of poultry feeds. Most of the youth concerned with the house-hold units stopped their activity and a few of them shifted to raise native chickens (their original career). Stopping of even the small-scale poultry farmers because of their high losses which could be referred to: the high cost of production for each production cycle in poultry farms. The decreasing market prices due to the increasing supply after the eruption of house-hold units. The high mortalities among chickens in their farms due to low resistance and bad quality of breeds.

The persistence of only the large-scale poultry farmers who rented most of the poultry farms of the small-scale farmers. The establishment of a league for poultry farmers in 1999 in Banha where the largest or main stock market for poultry is located. This league was activated in 2000 and started its main activity in regulating market prices of poultry in 2001 to avoid severe or dangerous market fluctuations.

The seventh stage (from 2001 until 2005): This stage was characterized mainly by the persistence and flourishing of the large-scale poultry farmers. They gained a lot of profits due to the following reasons: the very high market prices of chickens. Disappearance of house-hold units of white chickens. This aided in the decrease of supply and more market stability. Lowering the cost of production through the use of private mills by large-scale farmers in the manufacture of poultry feeds for their own farms. Thus, they saved much money as they buy the raw materials with lower wholesale prices. However, the average price of the starter poultry feed exceeded 1500 L.E. ton⁻¹ in 2003 and 2004 after freeing the price of the Egyptian pound in 2003. The development of indigenous ways to overcome the high temperature in summer by application of water sprayers around the windows of the farms. Furthermore, the continuous modernization through providing the poultry farms with air conditions, especially those farms located in the deserts where the ambient temperatures soar during summer season. Despite of the high cost of air conditions in the closed system of poultry farms, the high income due to the reduced mortality and increased growth rate of chickens cover the high expenses and more. The high experience of those farmers in management of their poultry farms and their strictness in following the proper systems of vaccination, medications and hygienic measures.

The eighth stage (from 2006-2011): This could be known of course as the stage of fowl influenza. Fowl influenza could be considered as the most dangerous catastrophe which faced the sector of poultry industry not only in Egypt but all over the world. This stage could be described as follows: fowl influenza was announced in the 2nd half of 2005 in many South-Eastern Asian countries. The 1st incidence of fowl influenza was declared in Egypt among house-hold native poultry (in duck and geese) on February 2006 by the ministry of Agriculture. Sudden and sharp decrees were decided by the governmental authorities in Egypt including: getting rid of all house-hold poultry in a maximum period of 2 weeks.

Restriction of movement by banning transfer of live poultry between governorates. Preventing the selling of live or slaughtered poultry in the live poultry's shops. As an alternative, those shops were licensed to sell frozen poultry. As a consequence, sharp disorders in both levels of retail and wholesale prices of poultry have taken place. Then, sharp fall in market prices of poultry meats to reach nearly half of their prices before the crisis. Moreover, the poultry farmers couldn't find a way to sell their birds rather than to the governmental slaughter houses for poultry which were a long line of waiting list. Later on, total condemnation of any infected birds in poultry farms with the compensation of their owners in the rate of 5 L.E./bird. Thus, a complete destruction of this large industry (19 Milliard L.E. was invested in this sector before the disaster of bird flu) was conducted including not only broilers or laying hens but also the highly precious brood stocks.

On May 2006 a few farms started to recover and operate again. As a result, the market prices of table egg, 1 day old chick, kilogram of white and native chickens were nearly doubled to reach 0.6, 3, 10 and 14 L.E., respectively due to their scarcity. More farms recovered on June 2006. On July 2006, the Egyptian government interfered in a trial to lower prices of chickens by opening the door of importation of frozen chickens (unaccepted by the Egyptian consumer) before the full recovery of all poultry farms and of the ruined poultry industry. It is worthy here to point out that despite the fact that fowl influenza was firstly announced in many South-Eastern Asian countries (the focus of infection), the governmental authorities in those countries took gradual decisions and gave their poultry farmers a period of 3 months as a deadline to stop their production as happened in Thailand. Thus, an earlier (on late 2005 and not on February 2006) and gradual interference (along a minimal period of 2-3 months) was mandatory to manipulate this crisis more wisely by the Egyptian government. Besides, a proper coordination between different governmental

authorities and a supreme scientific committee was needed to declare well-studied decisions for facing this outbreak instead of declaring hasty, sudden and individual decisions by different affected governorates.

A relative stability in prices of poultry feeds where the average price of the starter poultry feed settled down to 1500 L.E. ton⁻¹ in 2006. A pending governmental plan to transfer all poultry farms located inside or near to the civil clusters either in urban or rural areas to the deserts in the form of clusters of poultry farms (thousands of acres per each cluster). However, up to date, this plan has not yet accomplished. Similarly, plans to ban the manipulation of live birds to be replaced by frozen birds (prepared by slaughter houses) have not yet implemented.

ADVANTAGES OF POULTRY INDUSTRY COMPARED TO AQUACULTURE

Poultry industry is relatively an older, more well-established and more advanced enterprise than aquaculture. Aquaculture still requires more research to settle down and become well-established. Thus, aquaculture can benefit from poultry industry. There are several well-established systems for the management and control of poultry diseases: there are well-established systems of vaccination either for broilers, laying hens, brooders or even for 1 day old chicks. There are several alternatives and more than a company producing those live or dead vaccines. On the contrary, up till now there is no any well-identified system for vaccination in aquaculture. There are many systems for the control and treatment of different poultry diseases. The basic outline of those systems contains mainly the following points: anti-coccidial drugs for the control and treatment of coccidiosis which is the most dangerous protozoan disease affecting poultry.

Antibacterial drugs which are mainly antibiotics and sulphonamides. They are used either parenteral, added to water or mixed with feed. Those antibacterial drugs are usually used to control members of family enterobacteriaceae (mainly *Escherichia coli* and *Salmonella* sp.) and Chronic Respiratory Diseases (CRD). Antitoxins for the control of mainly Aflatoxicosis in poultry feeds. Vitamins and minerals supplementation as well as antioxidants. Non specific immunostimulants and anti-parasitic drugs. While in Aquaculture, there is not any established system for the management of fish diseases until now except the use of some antibiotics with fish feeds in what is called a medical ration. The prevalence of small-scale and house-hold poultry producers. The presence of intermediate poultry farms which produce native poultry of 2-3 weeks old for further

rearing by house-keepers. On the other hand, there are no intermediate fish farms in Egypt which can produce fingerlings and sell them to larger scale fish farmers. The prevalence of private mills for the manufacture of poultry feeds by large-scale poultry farmers for their own or rented farms. Those mills save a lot of money as the farmers buy the raw materials of the feeds from their original sources with cheaper wholesale prices.

Poultry farms are scattered nearly in all Egyptian governorates, especially in the Nile Delta. Fish farms are prevalent as clusters in mainly 5 governorates in the Delta. The presence of a league in Banha for poultry farmers to regulate market prices since, 1999. The presence of strong stock markets in Banha (the main market), Zagazig and Shebien El-Kom. While in aquaculture, there is El-Aubour market only near to Cairo. Good veterinary supervision which allows keeping accurate and daily records in poultry farms. Direct contact between scientists and poultry farms in the frequent and regular conferences organized by different pharmaceutical companies where farmers can get an easy access for research results and technology transfer.

DISADVANTAGES OF POULTRY INDUSTRY COMPARED TO AQUACULTURE

The frequent and dangerous fluctuations in market prices of poultry rendering this sector a very risky enterprise. On the contrary, no dangerous fluctuations in market prices of fish. The weak stability in the overall conditions which guarantee the success of this industry, especially in the main elements of production (brooders, egg, chicks and feeds). Neither the prices nor the quality or healthy conditions of these elements can't be guaranteed. The abusive practices such as the use of hormones and the excessive use of antibiotics and harmful chemicals which may cause drug resistance, hypersensitivity, renal failure or cancers for the human consumers. The great vulnerability of poultry industry to catastrophes as what happened with fowl influenza. Absent or very weak governmental support for this industry. No insurance system as all insurance companies refuse to cover poultry farms under their insurance umbrella because of the great risk and lack of governmental support. Similarly, no insurance system is applied in aquaculture although it hasn't been tried and despite of the relative lower risk than poultry industry. The very high cost of production now a days allowed only the large-scale poultry farmers to continue while small-scale farmers couldn't.

USEFUL LEARNED LESSONS FROM POULTRY INDUSTRY IN AQUACULTURE

Aquaculture can benefit from poultry industry through the proper utilization of its advantages and avoiding its disadvantages:

The proper utilization of the useful practices and advantages of poultry industry and applying what can be applicable in aquaculture: The establishment of several systems or alternatives of management and control of fish diseases either parasitic, bacterial, mycotic, viral or nutritional disorders. Initiation of multiple systems for vaccination with a special emphasis on bacterial vaccines which are more important than viral vaccines in the Egyptian conditions. The successfully experimented vaccines should be available on a commercial level for fish farmers. Application of common mills and pellet machines for each cluster of fish farms to be afforded by a group of farmers. In this way, fish farmers can lower the cost of fish feeds by benefiting from differences of prices between raw materials of fish feeds and the manufactured feeds. Private mills could be also suitable and economic for large-scale fish farmers who have large fish farms.

The need for a well-organized stock market for fish to regulate market prices according to the law of supply and demand. The mandate for a strict veterinary or agricultural supervision to guarantee that fish farmers follow the right scientific instructions for management of their farms. The mandate for intermediate or small-scale fish farms which can provide the large-scale fish farms with suitable sized fingerlings. Small excavated ponds or suitable land depressions in front of houses are suggested models. It can be a successful enterprise for youth to put several cheap happas in terminal water channels or other suitable water bodies where they can conduct a natural spawning for tilapia very easily then rear the fries till reach the fingerlings' size and sell them after that to large-scale fish farms. Rice fields could be used also as ideal intermediate farms to produce fingerlings or juveniles and sell them with profitable prices. This is also a practical solution for the problem that faces farmers with fish in rice fields as the produced fish don't reach the market size. Dissemination of house-hold fish ponds which rear fish till reach the market size and use the produced fish for the own family's consumption and sell the surplus. The need for a strong, well-organized and active league for all fish farmers in Egypt.

This league could be very useful in many aspects including: holding of meetings between fish farmers and exchange ideas or indigenous knowledge among each others. Besides, organizing meetings with scientists and

training courses for fish farmers or technicians to know new techniques and ideas decreasing the gap between them. Regulation of the time of harvest of fish between fish farmers to keep a stable and coordinate level of fish supply. Subsequently, avoid the acute lowering in market prices of fish. This coordination in the amount of fish supply is much easier to be applied in aquaculture because of the flexible and changeable aquatic ecosystem than in poultry industry where farmers can't keep poultry except for only several days due to the limited space and the relatively solid environment. The construction of a powerful saving box for fish farmers. The money of this box can be used for compensating fish farmers during emergency or catastrophes.

It is worthy here to point out that there are some active local leagues for fish farmers in Behera which was the first league to be established in the 80's of the 20th century followed by leagues of Fayium, Damietta and Kafr El-Sheikh established in 1993, 1997 and 2005, respectively. However, a united league for all fish farmers in Egypt will be more effective.

Avoiding the disadvantages, catastrophes and trying to shun the leading reasons through: restriction of movement and banning the introduction of new fish species to Egypt unless approved by a supreme scientific council after a full scientific study. Besides, a very strict veterinary quarantine should be applied on any imported fish species especially ornamental fish. These hygienic measures will prevent the introduction of any fatal disease to Egypt, especially viral diseases. Fortunately, viral diseases are not yet recorded among the edible and cultured fish species in Egypt so all efforts should be done to keep this blessing. Thus, any devastating catastrophes could be avoided in aquaculture as the catastrophe of fowl influenza that ruined the sector of poultry industry in Egypt was referred to the migratory birds and some imported polluted poultry feeds. Shunning the excessive use of chemicals and antibiotics by focusing on researches that use natural substances in dealing with fish diseases. Prohibiting the abusive practices such as the use of hormones as growth promoters and feeding the fish on dead animals and chickens. Focusing on researches that decrease the cost of elements of production especially fish feeds. Seeking for the governmental support and trying to include fish farms under the umbrella of insurance.

CONCLUSION

Thus, this study was conducted to investigate the advantages of poultry industry which can be applicable in aquaculture and to stop at the disadvantages as well as

the catastrophes that faced poultry industry to avoid them in aquaculture. Besides, to detect the areas of scientific researches that require more emphasis with a special concern to the area of fish diseases' management.

RECOMMENDATIONS

Researches should be directed towards the development of multiple systems for vaccination and control of fish diseases in aquaculture. Application of a strict veterinary supervision on fish farms. Application of a very strict veterinary quarantine measures on the imported fish or any introduced live fish species. A special concern should be paid to the imported ornamental fish to avoid the introduction of fatal viral diseases. Establishment of a strong unified league for fish farmers. Studying the feasibility of indigenous production of fish feeds by fish farmers using private or common mills and pellet machines as a new technique to decrease the cost of fish feeds as applied in many poultry farms.

Encouraging the house-hold and intermediate fish farms. Dissemination of fish farms all over the country including Upper Egypt with its warm weather during winter which can be utilized in the production and wintering of tilapia. Keeping accurate records in fish farms on a daily basis as in poultry farms. Decreasing the gap between aquaculture researchers and fish farmers via better communication, coordinated or more relevant researches to the field's problems and rapid technology transfer by rapidly publishing results of applicable researches in an easy language and cheap means. The formation of a well-organized stock market for fish to regulate fish prices in Egypt. Early and well-studied interference with catastrophes and seeking for graduation in the governmental decrees and avoiding sudden decrees to prevent socioeconomic fluctuations.

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