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# Nutritional Management of Broiler Rearing Farms in Guilan, Iran

Hossein Zaker Esteghamati<sup>1\*</sup>, Sayed Abdoullah Hosseini<sup>2</sup>, Hamid Reza Mohamadian Tabrizi<sup>3</sup>, Mohamad Hossein Palizdar<sup>3</sup> and Amir Meimandipour<sup>4</sup>

Received: 11 November 2011,

Accepted: 8 December 2011

## Abstract

From a total of 656 broiler farms with the permission of exploitation in Guilan province, data was gathered from 20% of active farms including 85 units (Capacity of over 1663000 portions of broiler chickens) to evaluate the management of nutrition and nourish using questionnaire. The questionnaires were completed by the interview method. The methods of making feed, feed formulation, the shape of grain, the frequency of feeding, the type of dietary supplement and food additives, the use of experts, feed conversion ratio, causes of mortality, the age of mortality, drinking and feeding systems, and how to use fine nourishing (in the shape of supplement or concentrate) were considered in this study. The performance was calculated for each broiler farm. According to the production index, the farms were divided into three groups of weak (200+25), medium (250+25), and good (300+25) and their differences were compared. According to the results, among the managerial factors, the factors such as: feeding system, water quality, the conformity of ration in nutrition with the needs of commercial strains and drinking management, have the most portion in creating the three groups of good, medium and weak, among the broiler rearing farms. Thus, in the study of each group's feeding system, the good group has the highest percentage of using automatic systems (86/60) and the weak group has the highest percentage of using manual systems. In comparing three groups regarding the drinking water quality, it was observed that good, medium and weak groups drink 92%, 61.84%, and 75% fresh water, respectively. Furthermore, in the weak group, most of the farms have used the water with tolerable hardness or saltiness. Finally, the conformity of strain's requirement with diet was examined among groups. The results showed that 16.5% of units followed this conformity and the percentages of the good, medium, weak groups was 11.12%, 28%, 53.5%, respectively.

### Keywords:

*Nutrition management, Broiler chickens' rearing farms, Guilan province*

<sup>1</sup> Msc of poultry nutrition, Chalous Branch, Islamic Azad University, Mazandaran, Iran.

<sup>2</sup> Department of Nutrition, Animal Science Research Institution of Iran (ASRI), Karaj, I. R. Iran.

<sup>3</sup> Department of Animal Science, Faculty of Agriculture, Chalous Branch, Islamic Azad University, Mazandran. Iran.

<sup>4</sup> National Institute of Genetic Engineering and Biotechnology (NIGEB), Tehran, Iran.

\* Corresponding author's email: [h\\_z\\_a\\_es@yahoo.com](mailto:h_z_a_es@yahoo.com)

## INTRODUCTION

The population growth especially in developing countries and the food poverty in parts of the world have caused especial attention to the subject of adequate access to food. In the planning and development perspective, food plays a fundamental role in providing society's health care as an economical good and also as one of the main products of economical development. Studies show that most people's diet have lack of protein and since protein, especially animal protein has an essential role in human nutrition, therefore, its quality and amount of use should be desirable (Niko Gofar, 2003).

In recent years, chicken meat widely has been used in human nutrition and in supplying the needed protein. Raising the chicken for meat has some especial advantages due to the rapid growth, ease of feeding, use of a closed space, having the lower conversion coefficient than other protein products, as well as provides materials required for the human body (Shirani *et al.*, 2007).

Nowadays, management and nutrition are the most important matters in aviculture industry. While management and proper nutrition reduce production costs and produce birds as economically as possible; they also supply products with higher quality to the market, and prevent from high environmental pollution causing by irregular use of nourishing substances in food rations and their disposal (Pope and Emmert, 2001). One of the important things used in broiler rearing is diet, because it allocates most of the production costs to itself (Havenstein *et al.*, 2003). Previous studies in Iran showed that attention to feed conversion ratio can have the most impact on the poultry incomes (Soloki, 2001; Chizari, 2001; Haji Rahimi & Karimi, 2009; Khamis Abadi *et al.*, 2007, Zamani *et al.*, 2004; Varmaghani, 2008).

Feed conversion ratio is the key factor of optimum production in the broiler house and some researchers believe that it is related to several factors such as mortality. Therefore, any improvement in this area can lead to the costs reduction and increased economic benefit (Shepard, 2004).

Iran, despite of having a significant sources

of animal husbandry specially in poultry industries, has failed to achieve the development goals, due to several deficiencies including low productivity, managerial weaknesses, lack of units efficiency and using the traditional methods of production (Soloki, 2001; Rezazadeh, 2003). Comparing to other countries, most of the poultry farms in Iran, have very high feed conversion ratio due to disregarding of proper nutritional principles (using of rations having energy, protein, amino acid, minerals and vitamins that are not proportionate to broiler's age, weight and body), and the lack of good nutritional management (the methods of feed storage, selecting the proper filter regarding to the bird's age, lightening programs and food additives). Moreover, rearing conditions such as density, water quality, drinking and feed containers, temperature and light are another problems which have been permanently reported (Varmaghani, 2008; Nimrouzi, 2001; Chizari, 2001; Haji Rahimi & Karimi, 2009; Khamis Abadi *et al.*, 2007; Reza-Zadeh, 2003; Rokni, 2001; Zamani *et al.*, 2004; Soloki, 2001; Samie, 2004; Shariatmadari *et al.*, 2005; Niknasab, 1998; Niko Gofar, 2003; Shirani *et al.*, 2007).

Thus, the present study seeks to address the conditions of nutritional management in Guilan, Iran's broiler rearing farms, in order to be effective in improving the quality and quantity of nutritional management.

## MATERIALS AND METHODS

In 2009, there have been 656 broiler rearing units with the permission of exploitation in Guilan province. Using questionnaire, the management of nutrition and nourish were evaluated in broiler farms. Data was gathered from 20% of active farms including 85 units (Capacity of over 1663000 portions of broiler chickens). The questionnaires were completed by the interview method.

The methods of feed preparation, feed formulation, the shape of grain, the frequency of feeding, the type of feed supplement, the use of food additives, the use of experts, conversion ratio, Causes of mortality, the age of mortality, feeding and drinking systems, and how to use

fine nourishing (in the shape of supplement or concentrate) were considered in the present study. Data was collected from Guilan’s broiler farms during the winter of 2011. SPSS software was used to analysis descriptive and inferential data. To examine production indicator, farms were divided into 3 groups as follow: weak (200+25), medium (250+25), and good (300+25).

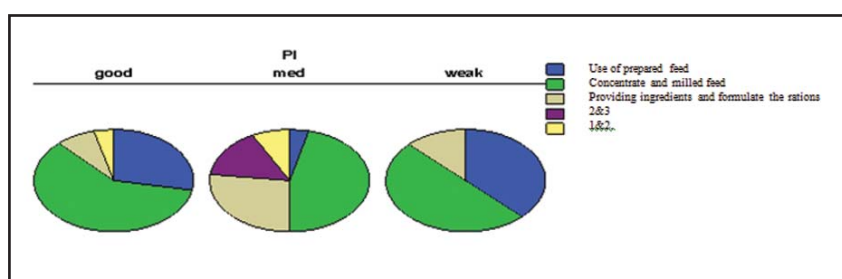
**RESULTS AND DISCUSSION**

The results of nutritional conditions in three groups of good, medium and weak are shown in Table 1. Based on the type of feed used by units, the farms' nutritional conditions are divided in five categories as follow: 14.1% of units use prepared feed, 50.6% use concentrated and milled feed, 20% provide ingredients and formulate the ration, 9.4% use the options 2 and 3, and 5.9% use the options 1 and 2 categories. This means that the most of units (over 70.6%) use “providing ingredients and concentrate. Table1.

The study of formulated rations is shown in Table 2. Based on the person who formulates

diet, four options were raised: expert, veterinarian, stock person and feed manufacturer company. According to the results, 16 units use experts (18.8%) ,24 units use veterinarians (28.2%), 28 units use stock person (32.9%), and 17 units use feed manufacturer companies (20%) which means, most of the units use their stock person or those who have no knowledge about the poultry nutrition and feed formulation.

In the next steps, the types of drinking system in Guilan’s broiler farms were examined among the groups. The types of drinking system divided into 6 categories as follow: 51 units used manual, seven units used gutter-shaped, nine units used cup-shaped, eight units used nipple-shaped, two units used both options 1and 2 and eight units used other methods. Comparison among the three groups showed that the percentage of good group in each category is 48%, 16%, 8%, 8%, 16%, 4%, respectively. These percentages for the medium group is 61.52%, 5.76%, 13.42%, 9.61%, 7.69%, 1.9% ,respectively, but in weak group just two types of these categories were used, manual (87.50%) and nipple-shaped (12.50%).



The nutritional conditions in examined units

Table1: Nutritional condition in broiler rearing farms

Groups	Use of pre- pared feed	Concentrate and milled feed	Providing ingredients and formulate the rations	2&3	1&2
Good	28	60	8	-	4
Medium	3.84	46.15	26.92	15.38	7.69
Weak	37.5	50	12.5	-	-
Total	14.1	50.6	20	9.4	5.9

Table2: The condition of the one who formulates the rations in broiler rearing farms

Groups	experts	veterinarians	The birder	feed manufacturer companies
Good	28	20	20	32
Medium	15.3	0.76	42.30	11.53
Weak	12.5	37.5	12.5	37.5
Total	18.8	28.2	32.9	20

Table 3: The condition of water supply resources in broiler rearing farms

Groups	deep well	semi-deep well	city water	aqueduct	1&3
Good	25	58.33	12.5	-	4.1
Medium	25	55.76	17.30	1.9	-
Weak	37.5	12.5	5	-	-
Total	26.2	25.4	19	1.2	1.2

Table 4: The condition of drinking areas in Guilan's broiler rearing farms

Groups	One drinking area	Two drinking area	Three drink area	Four drinking area
Good	58.33	33.33	-	8.33
Medium	52.08	27.08	6.25	14.58
Weak	50	25	12.5	12.5
Total	13.8	28.8	5	12.5

Table 5: The water replacement in Guilan's broiler rearing farms

Groups	complete replacement	adding fresh water on the residue water	automatic changing of water
Good	84	8	8
Medium	84.31	9.8	5.8
Weak	75	12.5	12.5
Total	83.3	9.5	7.1

Table 3, shows the water supply sources of Guilan's broiler rearing farms. These sources divided in five categories: 22 farms used deep well (26.2%), 44 farms used semi-deep well (51.4%), 16 farms used city water (19%), 1 used aqueduct (1.2%), and one used both option of 1 and 3 (1.2%). A comparison among the three groups showed that the percentage of each category in good group is 25%, 58.33%, 12.5%, 0%, 4.1%, respectively. These percentages for the medium group are 25%, 55.76%, 17.30%, 1.9%, 0%, respectively and for the weak group are 37.5%, 12.5%, 5%, 0%, and 0%, respectively.

The number of drinking areas in Guilan's broiler rearing farms is presented in Table 4. The number of drinking areas per 100 segments is divided in four categories. Comparison of the groups showed that the percentage of each category in good group is 58.33%, 33.33%, 0% and 8.33%, respectively. These percentages for the medium group are 52.08%, 27.08%, 6.25% and 14.58%, respectively and for the weak group are 50%, 25%, 12.5%, and 12.5%, respectively.

How to deal with the residue water in drinking places is one of the important issues in providing

safe water for the flock (Feddes *et al.*, 2002; King, 1996; Rokni, 2001; Varmaghani, 1998). For this purpose, the methods of "complete replacement of water", "adding fresh water on the residue water", and "automatic changing of water" were studied. The results showed that 70 farms used the first (83.3%), eight farms used the second (9.5%), and seven farms used the last method (7.1%). Comparison of the groups showed that the percentage of each method in good group is 84%, 8%, 8%, respectively. These percentages for the medium group are 84.31%, 9.8% and 5.8%, respectively and for the weak group are 75%, 12.5%, and 12.5%, respectively.

As shown in Table 6, three types of quality of water are used in Guilan's boiler farms: fresh water, tolerable saltiness and tolerable hardness. According to the gathered information, 73 units of 85 use fresh water (85.9%), two units use tolerable saltiness (2.4%), and 10 units use tolerable hardness (11.8%). Comparison among groups showed that according to the types of water, the percentages of good group are 92%, 4% and 4%, respectively. The medium group



percentages are 84.1%, 1.92% and 13.46%, respectively and the weak group percentages are 75%, 25%, 0%, respectively. In the weak group, the high percentages of farms use water with tolerable saltiness and tolerable hardness. It has been stated that the use of water with tolerable saltiness or tolerable hardness can cause metabolic and also parasitic diseases in the flock, resulting the productivity of the farm reduce and increase feed conversion ratio (Balanave and Gorman, 1993; Chen and Balanave, 2001; Barton, 1996; Counotte, 2000; Griffiths *et al.*, 1978; Julian, 1993; Juliet *et al.*, 1992; Kalimuthu *et al.*, 1987; Keshavarz, 2000; Shulock and Forbes, 1981; Marks, 1984; Pourreza *et al.*, 2000; Ruiz- Lopez and Austic, 1993; King, 1996).

As shown in Table 7, the filling level of water containers in Guilan's broiler farms is categorized in 3 types: filled up to 1.3 of water container, filled up to 2.3 of water container and the entire size of water container. Overall, 39 units used the first type (53.4%), 26 units used the second type (35.6%), and eight units used the last one (11%). According to type of filling level of water container, the good group's percentages are 68.18%, 31.81% and 0%, respectively. The

medium group percentages are 51.16%, 32.55% and 16.27%, respectively and the weak group percentages are 25%, 62.5% and 12.5%, respectively.

Table 8 shows the times that Guilan's broiler farms wash their watering-places in a week. Times of washing and disinfecting are divided into three categories of "Daily", "Twice or Less", "2 to 4 times". According to the results, 51 units wash and disinfect their system as a daily work (62.2%), 16 units did it twice or less (19.5%), and 15 units did it between 2 to 4 times (18.3%). Thus, in the good group the percentages each category are 62.5%, 25% and 12.5%, respectively. In the medium group, the percentages are 64%, 18%, 18%, respectively and the weak group includes 50%, 12.5% and 37.5%, respectively. Hence, the use of daily washing in the weak group is less than others.

Table 9 shows the types of Guilan's broiler farms' feed container in four categories: gutter-shaped, grid circular, chained automatic, and etc. Results showed that nine units used gutter-shaped containers (10.8), 16 units used grid-circular containers (19.3%), 40 units used chain automatic (45.8%), and 20 units used the other kind of containers (24.1%). Comparison of the

Table 6: The quality of water in Guilan's broiler rearing farms

Groups	Fresh water	Tolerable saltiness	Tolerable hardness
Good	92	4	4
Medium	84.1	1.92	13.42
Weak	75	-	25
Total	85.9	2.4	11.8

Table 7: The filling levels of water containers in Guilan's broiler rearing farms

Groups	1.3 of container	2.3 of container	Entire size
Good	68.18	31.81	-
Medium	51.16	32.55	16.27
Weak	25	62.5	12.5
Total	53.4	35.6	11

Table 8: The time of washing and disinfecting of Guilan's broiler rearing farms

Groups	Daily	2 time or less per week	2 to 4 times per week
Good	62.5	25	12.5
Medium	64	18	18
Weak	50	12.5	37.5
Total	62.2	19.5	18.3

Table 9: The type of feed container in Guilan's broiler rearing farms

Groups	gutter-shap	grid circular	automatic	Etc.
Good	12.5	16.66	54.16	16.66
Medium	9.61	21.15	44.23	25
Weak	14.28	14.28	28.57	42.85
Total	10.8	19.3	45.8	24.1

Table 10: Feeding system of Guilan's broiler rearing farms

Groups	manual	Semi-automatic	automatic
Good	62.5	30.43	60.86
Medium	64	46.15	38.46
Weak	50	62.5	12.5
Total	62.2	43.4	42.2

Table 11: Feed distribution times in Guilan's broiler rearing farms

Groups	Once	twice	Three times	Four times
Good	12.5	20.83	16.66	50
Medium	7.69	30.76	21.15	40.38
Weak	-	50	12.5	37.5
Total	8.3	29.8	19	42.9

groups showed that in the good group the percentages of each category are 12.5%, 16.66%, 54.16%, 16.66%, respectively. These percentages for the medium group are 9.61%, 21.15%, 44.23% and 25%, respectively and for the weak group are 14.28%, 14.28%, 28.57%, and 42.85%, respectively.

In addition, the results of examining the farms' feeding systems are shown in table 10. The systems are divided into 3 categories: manual, semi-automatic, and automatic. In this study 13 of 85 units used manual mode (43.4%), 12 units used semi-automatic (14.5%), and the last 35 units used the automatic mode (42.2%). The good group has the highest percentage in using the automatic mode, and the weak one has the highest percentage in using manual mode.

The times of feed distribution in Guilan's broiler farms are shown in Table 11. As can be seen the times of feed distribution are divided in 4 categories: one time, twice, three times, and four times a day. As the result shows, 7 farms use the first option (8.3%), 25 units use second option (29.8%), 16 units use the third (19%), and the 36 use the fourth option (42.9%). The comparison of groups showed that using

four times feeding in a day has the highest percentage and using once has the lowest. Furthermore, the possibility of changing the types of feeding was studied based on the broiler's age, and specified that the amount of this possibilities among the good, medium and weak groups are as follows: 91.6%, 86.5%, 75%, respectively.

Equalizing the size of all materials with the use of a mill is the next important things that were studied in this research. As shown in the results, 88.3% of the samples use equalized materials. It is worth mentioning that the mill's pores diameters must define by the age of birds. In this study, 73.1% of stock persons used filters in 2mm for the beginning period, 69.7% used 4mm for the growth period and 8mm for the final period.

Diaz (2002) stated that mixing duration is an important thing in proving rations. In this study, the mixing duration of 60% of the samples was about 45minutes which is scientifically too high, so it is recommended by determining the ration's sodium in different times of (5, 10, 15, 20,25, 30 and 35minutes) , find the time that ration's salt concentration is in conformity with the main formula, and consider it as the mixing time.

Table 12: Physical shape of ration in Guilan's broiler rearing farms

Groups	farinaceous	crumbles	Plate
Good	60	8	32
Medium	59.61	15.38	25
Weak	50	12.5	37.5
Total	58.8	12.9	28.2

Table 13: Farms' performance between the good, medium, and weak groups

Groups	Production index	survival	body weigh	Feed conversion ratio
Good	298.21	95.22	2746.16	1.92
Medium	255.59	94.49	2676.82	2.02
Weak	209.81	92.98	2556.25	2.12
Total	263.41	94.55	2685.15	2.007

Metabolic abnormalities associated with nutrition, is a problem of the modern broiler farms (Havenstein *et al.*, 2003, Cangar *et al.*, 2007). According to this study, 41.5% of the studied farms were suffering from those kinds of problems.

Data for the physical shape of farms' ration are presented in Table 12. As shown, the physical shape of diet used by broiler farms are divided into three categories: farinaceous (58.8%), crumbles (12.9%), and plate (28.2%). It is worth noting that, the good group with 60% has the highest percentage of using farina rations and the weak group with 50% has the lowest.

One of the important factors in improving the broiler performance is to feed immediately after hatching. Thus, the distance between the place of incubation and the rearing farm, is too important (Mbajjorgu *et al.*, 2007). In this study, 58.3% of the broiler farms are less than 6 hours, 29.8% are less than 2 hours, 9.5% are less than 24 hours, and 2.4% are more than 24 hours far from hatchery. Whereas nutrition of 85% of chicks, in less than 12 hours after hatching is considered as an effective factor in the performance of Guilan's farms.

The examination of Guilan's broiler rearing farms' performance is presented in Table 13. As shown, the production indicators differences in both groups of good and weak are 88.4% which shows a big gap between the performances of these groups and the medium group is intermediate. If we take a look at the production index formula, we find that, in the case of rising age, any changes in the percentage of survival, body

weight and feed conversion ratio, have a negative impact on the farm's performance.

From the commercial point of view, the production index is the number which shows the technical result of growing period in broiler chicken flocks. The greater amount of this index indicates the better economic results. So the production index computed by the following formula (the weight of an alive is in gram).

$$\text{Production index} = \frac{\text{The live weight} \times \text{survival percentage}}{\text{rearing period} \times \text{feed conversion ratio}} \times 10$$

### CONCLUSION

Considering to the role of nutritional management factors in increasing the units' technical efficiency, advertency to the managerial factors can be effective in improving the quality and quantity of production. According to the result of this study, there is a need for a short and long term planning in order to solve the farms' managerial problems with the use of educational tools and experts.

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