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Impact of Poultry Research Recommendations on the Development of Poultry Industry in Khartoum State (Case Study For the Period from 1989 to 2009)

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ABSTRACT

A study was conducted to identify the impact of the recommendations of the poultry research on the development of poultry industry in Khartoum state. A comprehensive survey by distributing special designed questionnaire for poultry producers in Khartoum state during the period from March 2010 to December 2010. The scientific poultry production recommendations in Sudan were collected from 120 theses (M.Sc. - Ph.D.) for the period from 1989 to 2009 in Sudanese universities. The study showed that 60.8% of these researches were in the field of nutrition, 5.83% of them in extension, and 3.33% in management of poultry farms. The rest of the researches were specialized in other fields related to poultry production in Sudan. The study showed that 57.7% of the poultry producers were using open system for production, 47.4 % layers raised, and 41.3% broiler chicks. Study also showed that 56.5 % of poultry producers' productivity was over 70%. For administrative farm records study found that 82.2% of producers have administrative records and 79.6% of them have supervisors on their farms. The study showed that 30% of the supervisors of the farms were specialized in animal production, 26.5% veterinarians, 3.2% of agricultural engineers, and 32.6% of supervisors unspecialized. The study showed that 98.3% of poultry producers did not receive any extension service. The study concluded that poultry industry can benefit from the poultry research results from inside and outside Sudan and its recommendations in the development of this section in Sudan, through the activation of extension Unit in Ministry of Agriculture and Animal Resources in Khartoum State and in coordination with all parties related to poultry production, by conducting training courses, workshops and regular conferences including all poultry sector workers so as to improve and develop this filed.

INTRODUCTION

World Poultry production has been steadily rising at the rate of 4% annually. The productivity of poultry has almost tripled in the last 100 years through genetic selection, improved feeding methods, implementation of modern technology, improved housing, better disease control and excellent management in addition to processing and improved storage of products (Elamin *et al*., 2008).

Poultry production has become one of the most popular and visible enterprises in Sudan. Profitable poultry industry is always characterized by quick body gain and high egg production with less utilization of feed (Paul et al, 2004).According to the records in the Ministry of Animal Resources and Fisheries (2008) Poultry production was estimated to 45.6 million.

Salih (2002) reported that the modern commercial poultry industry in Sudan was started by the establishment of the Sudanese Kuwaiti Company 1979 and the Arab Sudanese Poultry Company in 1982-1985 both were centered Khartoum. Then the poultry industry started to grow gradually around Khartoum and other towns in Sudan due to the rising demand for poultry products and the concurrent progress of animal feed industry and the activity of veterinary services. The first M.Sc. study in poultry science in the Sudan was carried out at the University of Khartoum, Faculty of Veterinary Science (Musharaf 1973, and Hassan 1998).

Broilers are the main type of chicken produced by modern integrated poultry raising facilities due to their high feed-meat conversion ratio (Food and Agriculture Organization of the United Nations, 2010). This study, focused on broilers for meat production and laying hens for egg production (with special emphasis on Khartoum state).

Research Problem: Despite of the plenty and numerous recommendations on poultry management and technical practices, poultry production in the Sudan is creeping and remained traditional.

The study Objectives: The study designed to achieve the following objectives:

1. To review and organize the previous theses and papers done in poultry science in the Sudanese Universities and Research Centres.
2. To evaluate critically the values and benefits of the recommendations of these studies and what have been applied in poultry production.
3. To propose the scientific managerial practice for modern poultry production in Sudan and how to diffuse it.

MATERIALS AND METHODS

The study took three steps to evaluate the tri-circle of production promotion (Research-Extension-Production):

Step1: Information on theses and papers done on poultry science in the Sudan from 1989 to 2009 were collected (120 theses).

The scientific theses and papers information were collected between November 2009 and March 2010 from:

a - Sudanese universities

b- Research centres

c- Conferences.

The collection had been done directly from the libraries of Sudanese universities and Research centres

Step 2: Practical field survey had been conducted with special designed questionnaire for the commercial poultry producers in Khartoum State, Sudan, to collect data about the managemental and technical practices used in poultry production covering the three farm systems:

1- The modern closed system (30 farms).

2- The semi closed system (26 farms).

3- The opened system (174 farms).

Step 3: Evaluation about the co-relation between the scientific recommendations and actual managemental and technical practices applied in Sudanese poultry farms.

The collected data from the scientific findings and the actual managemental practices at the poultry farms were criticized and evaluated by tabulating them according to the following:

1- Year of the degree awarded.
2- Major Field of the study.
3- Type of birds used in the studies carried.

Area of the study: Khartoum State was the area selected to carry out the study, where the commercial poultry production is largely concentrated. Khartoum is located in the center of Sudan. It is the seat of government, the center of higher education and several commercial and industrial establishments; in addition it has the largest terminal livestock markets supply, being the national capital of Sudan.

Khartoum has a better economic status compared to other cities and rural areas.

The population and sampling procedures: According to the present records in Ministry of Agriculture and Animal Resources, there are (527) poultry farms in Khartoum State engaged in egg production, meat production and hatching. Practical field survey submitted with special designed questionnaire for (230) commercial poultry farms in Khartoum state, during the period from March 2010 to September 2010 by using stratified random sampling technique.

Statistical Analysis: The collected data was analyzed by using Statistical Package of Social Sciences (SPSS) computer program (version 11.5).

1. Percentages were used to describe the distribution of poultry producers.
2. Frequencies were used to enumerate the numbers of producers.
3. Chi-Square values were used to measure the significances of dependency.

RESULTS AND DISCUSSION

A-The scientific research done on poultry in the Sudan from 1989 to 2009: The following Tables reflect the scientific research done for the period mentioned: Table (1) shows that the distribution of published theses, research papers, workshops and conferences on poultry in the Sudan extending from 1989 to 2009, There were only 154. They included different recommendations. Poultry development needs those recommendations.

Table 1: Distribution of published theses, research papers, workshops and conferences on poultry in the Sudan from 1989 to 2009

Type of scientific research	Number of studies	Percentage (٪)
Theses	120	78
Research papers	19	12
Workshops	11	7
Conferences	4	3
Total	154	100

Table (2) shows the theses classification according to year of degree awarded between 1989 and 2009, described over three periods of (7) years each. Period iii (2003-2009) witnessed the highest percentage of theses awarded 65%

followed by period ii (1996-2002) 21% and lastly period I (1989-1995) has the lowest percentage 14%.

It is clear that the awarded degrees were increasing through time, and the percentage reached 65% between (2003-2009).This may be due to the following reasons:

1- There was a gradual increase in the interest in poultry studies, progress in development of poultry industry and increase in the number of internal PhD holders especially in Khartoum and Gezira Universities.
2- Increase in poultry research facilities such as poultry research houses, laboratories and libraries, and the need of solving problems facing poultry producers.
3- Increase in the number of qualified personnel in the field of poultry according to the revolution of higher education, and more than 30 Universities were graduating.
4- The consumers demand and taste converted from consuming red meat to white meat according to rising of red meat prices.

Table 2: Classification of theses according to year of degree awarded

Year	Number of theses	Percentage (%)
1989-1995	17	14
1996-2002	25	21
2003-2009	78	65
Total	120	100

The highest percentage of theses subject was in nutrition 60.8%, production 15.8%, microbiology 6.66%, extension 5.83%, multidisciplinary 4.16%, management 3.33% and toxicology 1.66%. On the other hand biochemistry and breeding showed the lowest percentage each was 0.83%.

As seen from the Table (3) the nutrition ranked first about 60.8% of the whole subjects. This is because of its short duration, availability of the raw materials and because it was not costly work but a major item of production.

In other words there was a considerable work done in production 15.8%, but very little work in other subjects. This may be due to the following reasons as stated by Hassan (1998):

1- Some need more research fund and time.
2- Inadequate qualified personnel in some of these fields.
3- These subjects are areas of poor attention for the graduate students, because employment opportunities in the job market are scanty.

Table 3: Classification of theses according to major subject of studied areas

Subject of study	Number of studies	Percentage (%)
Nutrition	73	60.8
Production	19	15.8
Microbiology	8	6.66
Extension	7	5.83
Multi-disciplinary subjects	5	4.16
Management	4	3.33
Toxicology	2	1.66
Biochemistry	1	0.83
Breeding	1	0.83
Total	120	100

Broilers represented the main experimental birds 71%, followed by layers 18% and the lowest percentage 11% was broilers and layers together. This may be to the preference of broilers to researchers due to their short cycles, easy management and less problems and vice versa for layers.

Table 4: Classification of theses according to type of birds used in the studies carried

Type of birds	Number of theses	Percentage (%)
Broilers	85	71
Layers	22	18
Broilers and layers	13	11
Total	120	100

As seen from the Table (5) University of Khartoum ranked first and awarded 59.16% of the theses as more than 90% of poultry production is in Khartoum State. This result is in agreement with that obtained by Hassan (1998) who added that during the period (1977-1980), the poultry unit at Khartoum North has been handed over to the Faculty of Veterinary science University of Khartoum, so as to support scientific research in poultry production and the first Master of science degree in poultry production in the Sudan was carried out in this farm. As time passed, many degrees were done at this University till now.

Master degrees of science obtained in poultry science were higher 82% then Master of Veterinary Science and Doctor of philosophy degrees (5% and 13% respectively), this result is consistent with that obtained by Hassan (1998),and the reason behind that may be due to the few number of PhD holders in the field of poultry production at that time.

The contribution of males in poultry science was higher in comparison to females (73% and 27% respectively). This result is close to that reported by Takana (1998) who added that the nature of the Sudanese women preferred office work than research in poultry which involves- under the current circumstances-much physical activities.

Table 5: Classification of theses according to universities, degree awarded and gender of author

	Number of theses	Percentage (%)
Universities:		
Khartoum	71	59.16
Sudan University of Science and Technology	21	17.5
Gezira	14	11.6
Omdurman Islamic	7	5.8
Juba	3	2.5
Elneelain	2	1.6
Alzaeim Alazahry	1	0.83
Kordofan	1	0.83
Total	120	100
Degree awarded:		
M.Sc.	98	82
M.V.Sc.	6	5
PhD	16	13
Total	120	100
Gender of author:		
Males	88	73
Females	32	27
Total	120	100

Chi-square Test: Chi-square test was performed to measure the significance of dependent variables with respect to independent variables at the (0.05) probability level, to evaluate the impact of the independent variables on the dependent.

Impact of housing system: The type of production, flock size and other managerial practices of poultry producers included tools to control temperature hazards, cleaning and disinfecting of poultry house, as well as cleaning of feeders, drinkers and water lines periodically were highly significant($p<0.05$) affected by the type of housing system.

The result showed that the number of layers, broilers and chicks' production was highest in open housing system followed by closed housing system. This result confirms previous study (Emam and Hassan, 2011) who revealed that, most of the private poultry farms in Khartoum State were the open-system with different scales of poultry production.

Table 6: Impact of housing system on different managerial practices of poultry producers

Dependent variables	Type of housing system					Total	L.S
	Opened	Semi-closed	Closed	Opened and Semi-closed	Semi-closed and closed		
1-Type of production:							
Layers	100	3	4	0	2	109	
Broilers	54	20	21	0	0	95	
Chicks	16	0	1	0	0	17	
Other(Pigeons)	1	1	1	0	0	3	**
Layers with broilers	2	0	1	0	0	3	
Layers with Chicks	1	1	0	1	0	3	
2. Flock size:							
1000-3000	98	2	1	0	0	101	
3001-5000	39	7	0	0	0	46	**
5001-10000	25	12	7	0	1	45	
More than 10000	12	4	20	1	1	38	
3.Tools to control temperature hazards:							
Yes use	71	22	27	1	2	123	
No use	103	3	1	0	0	107	**
4. **Cleaning and disinfecting of poultry house:**							
Daily	8	2	4	1	1	16	
Weekly	27	3	0	0	0	30	
Monthly	110	13	20	0	0	143	**
Sometimes	29	7	4	0	1	41	
5. periodical cleaning of feeders, drinkers and water lines:							
Yes use	166	24	27	1	0	218	**
No use	8	1	1	0	2	12	

In this table and in subsequent tables:
L.S = Level of Significance. N.S = Not significance ($p>0.05$).
* = Significance ($p< 0.05$). ** = High significance ($p<0.01$).

Impact of supervisor on the farm: As is shown in the Table (7) the flock size was highly significantly ($p<0.01$) affected by the supervisor on the farm. The large and medium scale producers whose flocks are ranging between3001-5000bird/farm and over 10000 bird/farm need supervisor on the farm to apply all technological practices in poultry production. No significant differences ($P>0.05$) were observed in the type of production, and other different managerial practices of poultry producers.

Table 7: Impact of supervisor on the farm on different managerial practices of poultry producers

Dependent variables	Supervisor on the farm		L. S
	Yes	No	
1-Type of production:			
Layers	86	23	
Broilers	78	17	N.S
Chicks	12	5	
Other(Pigeons)	1	2	
Layers with broilers	3	0	
Layers with Chicks	3	0	
Total	**183**	**47**	
2. Flock size:			
1000-3000	70	31	
3001-5000	37	9	**
5001-10000	39	6	
More than 10000	37	1	
Total	**183**	**47**	
3.Tools to control temperature hazards:			
Yes use	107	16	**
No use	76	31	
Total	**183**	**47**	
4. Cleaning and disinfecting of poultry house:			
Daily	14	2	N.S
Weekly	25	5	
Monthly	114	29	
Sometimes	30	11	
Total	**183**	**47**	
5. periodical cleaning of feeders, drinkers and water lines:			
Yes use	173	45	N.S
No use	10	2	
Total	**183**	**47**	

Impact of keeping records of regular management: Record keeping is extremely important to successful poultry production. keeping records of regular management as an independent variable was affected by different practices but the most effective one was its correlation with the flock size highly significantly ($p<0.01$). This situation facilitates the diffusion of technical recommendations to the producers.

Table 8: Impact of keeping records of regular management on different managerial practices of poultry producers

Dependent variables	keeping records of regular management		L.S
	Yes	No	
1-Type of production:			
Layers	84	25	
Broilers	81	14	N.S
Chicks	15	2	
Other(Pigeons)	3	0	
Layers with broilers	3	0	
Layers with Chicks	3	0	
Total	**189**	**41**	
2. Flock size:			
1000-3000	74	27	
3001-5000	36	10	**
5001-10000	42	3	
More than 10000	37	1	
Total	**189**	**41**	
3.Tools to control temperature hazards:		14	
Yes use	109	27	**
No use	80		
Total	**189**	**41**	
4. Cleaning and disinfecting of poultry house:			
Daily	15	1	N.S
Weekly	24	6	
Monthly	121	22	
Sometimes	29	12	
Total	**189**	**41**	
5. periodical cleaning of feeders, drinkers and water lines:			
Yes use	180	38	N.S
No use	9	3	
Total	**189**	**41**	

Extension Circle: Sudan recognized the potential of poultry industry in early fifties of last century where imported breeders were brought to Sudan by government and private sector subsequently farmers recognized the potential of including poultry production in their farms, this was further accelerated by urban development after country independence in 1956 (MEAP, 2007).

Hassan (1998) showed that many types of the European breeds were especially imported and raised on the farms. Gradually the poultry industry started to grow around Khartoum and other cities in the country making use of available veterinary extension services, the concurrent growth of the animal feed industry and the rising demand for poultry products.

Elsheikh (1993) reported that in 1963 the poultry unit at Hilatt Kuku was funded by the American aid and the objectives were set out as follows:

-To serve as extension unit for poultry producers in Khartoum province.

-To act as training facilities for government al poultry personnel in different provinces.
-To carry out survey and to conduct research in various poultry fields.
-To provide one day –old chick and good quality feed to the poultry keepers around Khartoum.
-To provide governmental poultry units with one day-old chicks and imported feed concentrate to different provinces in the country.
-To import modern equipment for poultry production.
-To design the national plan for poultry industry development in the Sudan.

Mohammed (2005) reported that poultry farming in the Sudan is growing rapidly. New methods and technologies for attaining higher production are being widely adopted. The process of transforming poultry production from traditional farming into modern industry is well under way and extensionally supported.

CONCLUSION

The potential value of poultry in developing countries is now being belatedly recognized or in some cases rediscovered and many African countries are attempting to increase the production of both meat and eggs.

Commercial poultry production in Khartoum State is divided into three farms systems, the modern closed system, semi-closed system and the open-system. The current technical information was in limited use. New improved technical practices should be diffused to producers by linkage between research, technological recommendations and active extension personnel through suitable channels to producers in order to raise productivity in this sector.

RECOMMENDATIONS

Based on the present study the following recommendations needed to be taken into consideration to improve productivity and increase profitability of poultry production in Khartoum and Sudan as a whole:

1- Closed and semi-closed poultry housing system with advanced high-tech should be encouraged and established instead of opened poultry housing system**,** to avoid (heat stress, mortality, low weight gain, spread of disease and feed waste).
2- New and highly technical practices should be diffused to producers by linkage between research, technological recommendations and active extension personnel through suitable ways (training, mass-media and successive field visits).
3- Increase the number of qualified personnel (animal production specialists, veterinarians and agriculturalist) in the field of poultry production.
4- Control poultry diseases by bio-security measures and hygienic programs.
5- More scientific researches on bio-security and quality control in poultry production under Sudan conditions.

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