Factors Affecting Small-Scale Broiler Chicken Farm Profitability and Challenges Faced by Farmers in Egyptian Rural

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ABSTRACT

This study was conducted in Al-Sharkia and El-Fayoum provinces, Egypt, and aimed to determine factors affecting small-scale broiler chicken farm profitability and challenges faced by broiler farmers in Egyptian rural. A stratified random sampling technique was applied to collect data from 200 individual small-scale broiler farmers randomly selected in two provinces, 100 from each province. Data were collected through semi-structured interviews with questionnaires and direct observation at the farm level. The log-linear regression model form of a flexible Cobb-Douglas production function was used to analyze factors affecting the profitability of small-scale broiler chicken farms. The results indicated that women (60%) were the majority of owned flocks. The average respondent farmer's age was 41.98 years old. The majority of the small-scale broiler performance was low and medium performance. The coefficients of the value of experience, gender, education, labor type, extension, training, veterinary, credit, flock size, management interventions, marketing information, and the market price of live chickens were positive influences, while farmer age, feed cost, home consumption, and mortality rate negatively influence the broiler profitability. The major challenges faced by small-scale broiler producers to increase their profitability are poor feed quality and access to marketing, veterinary services and credit. Therefore, efficient feed resources, marketing and veterinary services should be implemented to support small-scale broiler producers.

Keywords: chicks; constrains; efficiency; village

INTRODUCTION

Egypt is an agriculture-based country. Economic growth and stability are dependent on agricultural development. Agriculture accounts for approximately 11.5% of the total GDP, and the livestock sector contributes about 37.5% of total agricultural production. The poultry sector contributes about 24.9% of total livestock production, while the rural sector contributes approximately 31% of total poultry production, including 10.44% of broiler chicks (MALR, 2019 & CAPMAS, 2020). Due to population growth, economic expansion, and the increased demand for animal-based foods, poultry production in Egypt has developed quickly (Tellioglu & Konandreas, 2017). The poultry sector, especially broiler chick, in Egypt, has witnessed significant growth during the past 50 years, which was 26.41 and 1558.98 million broiler chicks in 1970 and 2020, respectively, as shown in Figure 1 (CAPMAS, 1970; CAPMAS, 1980; CAPMAS, 1990; CAPMAS, 2000; CAPMAS, 2010; CAPMAS, 2020; MALR, 2020). Small-scale family poultry production was a part of this transformation to

address the nutritional deficiency and eradicate poverty (FAOSTAT, 2014; Fasina *et al.*, 2016).

According to Padhi (2016) and Mekled *et al.* (2019), poultry production is regarded as a secondary agricultural activity by smallholders, and it contributes significantly to meeting essential family needs by providing additional income and high-quality protein. Despite the significant contribution of small-scale broiler rural poultry production as a subsector of agriculture, the level of production and productivity remains unstable and suffering. Furthermore, research on the severity of factors and problems affecting the production performance and profitability of small-scale broiler rural poultry production is limited. The production efficiency performance of small-scale broiler rural poultry production could be associated with adopting production technologies, economic efficiency, available institutions' support and access to markets, and socio-economic factors (Padhi, 2016).

According to previous studies on the socio-economic factors affecting the production of broilers in Egypt, the key factors affecting the production of
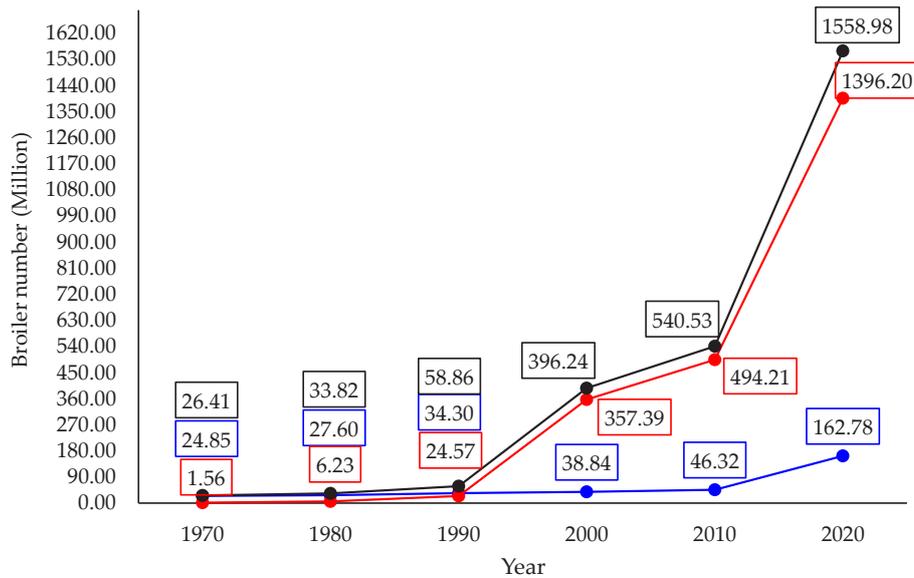
Figure 1. The number of broiler chicks in Egypt lasts 50 years, from 1970 to 2020 (Million chicks). Source: CAPMAS, 1970-1980-1990-2020 & MALR, 2020. Note: —•— Baladi meat (Rural sector); —•— Broiler (industrial); —•— Total

broilers were the farmer's age, level of education, experience, primary employment, farm size, and availability of extension services. The biggest obstacles to broiler farming included disease outbreaks, expensive feed, unstable prices for chicks and live broilers, and harsh weather (Hassan, 2017). Moreover, small-scale rural poultry producers who adopt management intervention have a greater effect on their chicken productivity (El-Menawey & Hamouda, 2018). Hatab *et al.* (2021) in Egypt have reported that sustainable small-scale broiler systems need to adopt more integrated resilience-based approaches. Moreover, to deal with various business risks, women's training programs, financial access, access to new management techniques, market access, and the establishment of broiler producer associations are required. As a result, identifying the factors affecting the profitability of small-scale rural broiler poultry production may support the establishment of strategies to improve the profitability of small-scale broiler rural poultry farmers.

Therefore, the present study sought to determine some factors influencing the profitability of small-scale rural broiler poultry production and identify the main problems faced by broiler farmers in Egyptian rural.

METHODS

Studied Areas

This study was conducted in the two provinces of Al-Sharkia and El-Fayoum in Egypt. Al-Sharkia Province, located in northern Egypt between latitude 30.70 °N and longitude 31.63 °E, ranks first in broiler production and third in population. According to population estimates, most province citizens live in rural regions, with a 24.3% urbanization rate. Out of an estimated 7,642,193 inhabitants in the province, 5,784,803 reside in rural regions, while just 1,857,391

dwells in urban areas. Agriculture is the basic business of the people. Al-Sharkia Province comprises 13 administrative divisions and 16 cities, 2 districts, 105 rural native units, and 3885 minor villages. The second location was El-Fayoum Province, located in the middle of Egypt and lies between latitude 30.84 °N and longitude 29.31 °E. El-Fayoum is the oldest poultry production province in Egypt. According to demographic estimates, the majority of citizens of El-Fayoum Province live in rural regions, with only 22.5% urbanization. Approximately 3,848,708 people reside in El-Fayoum Province: 862,111 people live in urban areas, whereas about 2,986,597 live in rural areas. El-Fayoum Province is divided into six districts (Ministry of Agriculture and Land Reclamation (MALR) 2019 & Central Agency for Public Mobilization and Statistics (CAPMAS, 2020).

Data Collection

This study was conducted from June to November 2021. Based on the majority of farmers producing broilers under Egypt's rural small-scale system, the provinces of Al-Sharkia and El-Fayoum were selected for having the highest density of small-scale rural broilers and high market access. A stratified random sampling technique was applied to collect data from 200 individual small-scale broiler farmers randomly selected in the two provinces, with 100 farmers from each province divided into two districts (each with 50 farmers), and two villages in each district (25 farmers from each village). Data were collected through a direct interview method using a pretested structured questionnaire and direct observation at the farm level. The questionnaires inquired some information about farmers' socio-economics, institutional support, production performances of small-scale broiler chicken farms, and marketing in rural Egypt.

Benefit-Cost Ratio (BCR)

The benefit-cost ratio was used to determine broiler production performance (BCR). First, the total variable cost/chick/production period (45 days) was calculated as a sum of chick price, vaccine, medicine, electricity, and feed costs. Second, meat revenues for chickens' live body weight at 45 days old (marketing or selling age) were used to calculate the benefits/chick/period (45 days). Third, the BCR was calculated using the formula: BCR = benefit/cost (Gittinger, 1982). Finally, according to the BCR values, the rural small-scale broiler farms were classified into high, intermediate, and low performances.

Statistical Analysis

Data were analyzed by SAS (2014). The chi-square procedure was used to test the enumeration data from the field survey (Snedecor & Cochran, 1989). The log-linear regression model was used to determine the relations between the farmer's age, experience, education, flock size, feed cost, labor cost, live broiler chickens market price/kg, gender, labor type, extension, training, veterinary services, group membership, access to credit, management interventions, marketing information, home consumption percent, and mortality rate of broiler on small-scale broiler rural production (independent variables), and benefit-cost ratio (BCR) in Egyptian rural (dependent variable). The regression model takes the log specification because not all the explanatory variables (X_i) are linearly related to the value of output (Y_i) and parameter estimates can be interpreted as elasticity. It takes the form of a flexible Cobb-Douglas production function. The log-linear regression model is a transformed model and assumes a linear relationship exists between the log dependent variable and log explanatory variable. This transformation into logs enables estimation using a traditional procedure, where ln (Y_i) is a linear function of logs of regression, logs of X's (Gujarati, 2004; Greene, 2012). The log-linear regression model used in the analysis was as follows:

$$\ln(Y_i) = \alpha + \beta_1 \ln(X_1) + \beta_2 \ln(X_2) + \beta_3 \ln(X_3) + \beta_4 \ln(X_4) + \beta_5 \ln(X_5) + \beta_6 \ln(X_6) + \beta_7 \ln(X_7) + \beta_8 X_8 + \beta_9 X_9 + \beta_{10} X_{10} + \beta_{11} X_{11} + \beta_{12} X_{12} + \beta_{13} X_{13} + \beta_{14} X_{14} + \beta_{15} X_{15} + \beta_{16} X_{16} + \beta_{17} X_{17} + \beta_{18} X_{18} + \varepsilon,$$

where α is the intercept term, Y is the value of output computed of the value of profitability (BCR), X_1 is the farmer's age (years), X_2 is the experience (years), X_3 is the education (years), X_4 is the flock size (N), X_5 is the feed cost (EGP), X_6 is the labor cost (EGP), X_7 is the live broiler chickens market price/kg (EGP), X_8 is the gender (women, 1; male, 0), X_9 is the labor type (women, 1; family, 0), X_{10} is the extension (access, 1; no access, 0), X_{11} is the training (access, 1; no access, 0), X_{12} is the veterinary services (access, 1; no access, 0), X_{13} is the group membership (yes, 1; no 0), X_{14} is the credit (access, 1; no, access 0), X_{15} is the management interventions (adopted, 1; non-adopted, 0), X_{16} is the marketing information (access, 1; no access 0), X_{17} is the home consumption in percent (10-25%, 1; <10%, 0), X_{18} is the mortality rate in percent (50-100%, 1; <50%, 0), β_i is the coefficients of the explanatory variable, ln is the natural logarithm, and ε is the error term (ε independently, normally distributed with zero mean and constant variance).

Ranking the Indexes of Problems Faced by the Farmers

Broiler farmers who participated were asked to assign weights to 17 problems based on their severities, and these problems were formulated after reviewing and checking their relevance to the study subject. The problems associated with small-scale broiler producer farmers in Egyptian rural were graded as severe, medium, light, and none and scored as 3, 2, 1, and 0, respectively. The consequences of these problems were determined according to the problem faced index (PFI) proposed by Ali & Hossain (2010) as follows: PFI=3×FS+2×FM+1×FL+0×FN, where FS is the number of the farmers that faced severe problems, FM is the number of the farmers that faced medium problems, FL is the number of farmers that faced light problems, and FN is the number of farmers that faced no problems (None).

RESULTS

Socio-Economic Profile and Institutional Support of Respondent Farmers

As shown in Table 1, most flock owners were women (60%). The average age of producer farmer's was 41.98 years old. A large portion (67.50%) of the producer farmers were in the middle-aged group (30-45 years old), while 22.50% and 10% of farmers fell in the young (<30 years old) and older age groups (>45 years old), respectively. The majority of farmers (67.50%) had intermediate experience ranging 5-10 years, with an overall mean of 11.23 years of experience. Regarding the education level in the studied areas, a large portion (52.50%) of the farmers had high education, followed by 37% who had intermediate education.

The women undertook the majority of tasks (89.50%) of small-scale broiler producer farmers, while the remaining tasks were undertaken by the rest of the family (10.5%). About 91.50% and 60% of respondent farmers rejected working in group membership and had no access to marketing information, respectively. Almost all respondent farmers (96%) adopted new management interventions. Nearly 52.50% of broiler farmers sell live broiler chickens to intermediaries or agents, whereas the rest (47.50%) sell their live broiler chickens by themselves in local areas or village markets. In most small-scale rural production, chicken production receives limited institutional support services, such as veterinary services, extension services, credit, and training. In the studied areas, 77.50%, 72%, 75%, and 83.50% of the respondent farmers had no access to formal credit, veterinary, extension, and training services, respectively. In the studied areas, the overall mean broiler chicks flock size was 79.65 chicks. The majority (80%) of farmers had a flock of fewer than 100 chicks (35% and 45% of the respondents reared chicks <50 and

Table 1. Distribution of the respondents' socio-economic profile and institutional support

Variables	Category	N	(%)	Mean	p-X²
Farmer gender	Women	120	60	-	**
	Males	80	40		
Farmer age (years)	Young (<30)	45	22.50	41.98	***
	Middle age (30–45)	135	67.50		
	Older (>45)	20	10		
Experience (years)	Little (<5)	40	20	11.23	**
	Intermediate (5–10)	135	67.50		
	Large (>10)	25	12.50		
Education level (years)	Illiteracy (<1)	5	2.5	-	***
	Elementary school (1-6)	16	8		
	Intermediate (7-15)	74	37		
	High (≥16)	105	52.50		
Labor type	Women	179	89.50	-	**
	Family	21	10.50		
Veterinary services	Yes	56	28	-	**
	No	144	72		
Access to extension	Yes	50	25	-	**
	No	150	75		
Access to training	Yes	33	16.50	-	**
	No	167	83.50		
Access to credit	Yes	45	22.50	-	**
	No	155	77.50		
Group membership	Yes	17	8.50	-	***
	No	183	91.50		
Access to marketing information	Yes	80	40	-	**
	No	120	60		
Marketing	Local selling	95	47.50	-	**
	Middlemen	105	52.50		
Management interventions	Non-adopted	8	4	-	***
	Adopted	192	96		
Flock size	F1 (<50)	70	35	79.65	***
	F2 (50–100)	90	45		
	F3 (101–200)	35	17.50		
	F4 (>200)	5	2.50		

Note: p-X² between item in column (**=p<0.01 and ***=p<0.001). F1= flock containing <50 broiler; F2= flock containing 50–100 broilers; F = flock containing 101–200 broilers; F4= flock containing >200 broilers.

50–100, respectively), and the remaining (20%) reared flocks of more than 100 up to 200 chicks (17.5% and 2.5% of the respondents reared 101-200 and >200 chicks, respectively).

Broiler Productive Performance as a Benefit-Cost Ratio (BCR)

BCR or profitability was determined for the economic performance of broiler production and classified as low (≤1.10), medium (1.11–1.30), and high (≥1.31), with an overall mean of 1.24 as presented in Table 2. The results reflected that 72% of the small-scale broiler farmers obtained medium performance (81.25%, 71.43%, 55%, and 54.55% in F1 (<50 broilers), F2 (50-100 broilers), F3 (101-200 broilers), and F4 (>200 broilers), respectively), whereas 10.50% obtained high performance. The majority of the small-scale broiler performance (89.50%) obtained low and medium performance, which could

be due to many problems faced by the farmers, such as feed quality, poor management, poor technology, flocks' health state, selling, extension, and training serveries.

Factors Affecting the Profitability of Small-Scale Broiler Production

In the log-linear regression model assumption, there is a linear relationship between the log of the dependent variable and independent variables. Socioeconomic characteristics were included in the model on the assumption that they influence small-scale broiler profitability (dependent variable). The results in Table 3 indicated that the model $R^2= 0.68$ with p<.0001. The estimated coefficients of the value of experience, gender, education, labor type, extension, training, veterinary services, access to credit, flock size, management interventions, marketing information, and live broiler chickens' marketing price were positive influences. On

Table 2. Distribution of the broiler producer respondents by production performance as the benefit-cost ratio

Performance (%)	F1 (<50)		F2 (50–100)		F3 (101–200)		F4 (>200)		Overall	
	N	(%)	N	(%)	N	(%)	N	(%)	N	(%)
Low (≤1.10)	12	18.75	19	18.10	2	10	2	18.18	35	17.50
Medium (1.11–1.30)	52	81.25	75	71.43	11	55	6	54.55	144	72
High (≥1.31)	0	0	11	10.47	7	35	3	27.27	21	10.50
Farm (N)	64	32	105	52.50	20	10	11	5.50	200	100
Total BCR (M±SE)				1.24±0.06						

Note: F1= flock containing <50 broilers; F2= flock containing 50–100 broilers; F3= flock containing 101–200 broilers; F4= flock containing >200 broilers; BCR= benefit-cost ratio.

Table 3. Estimates coefficients of factors affecting the profitability of small-scale broilers farms in Egyptian rural

Variables	Estimate coefficients	SE	t value	Pr>|t|
Intercept (constant)	0.888***	0.053	16.63	<.0001
Experience (years)	0.008***	0.002	3.86	0.000
Gender (women, 1; male, 0)	0.274***	0.081	3.39	0.001
Education (years)	0.009**	0.001	2.19	0.002
Labor type (women, 1; family, 0)	0.148***	0.036	4.08	<.0001
Extension (access, 1; no access, 0)	0.124***	0.026	4.79	<.0001
Training (access, 1; no access, 0)	0.288***	0.031	9.31	<.0001
Veterinary services (access, 1; no access, 0)	0.039**	0.058	0.34	0.007
Credit (access, 1; no, access 0)	0.116***	0.032	3.55	0.001
Flock size (N)	0.001***	0.022	6.83	<.0001
Management interventions (adopted, 1; non-adopted, 0)	0.111***	0.032	3.35	0.001
Marketing information (access, 1; no access, 0)	0.026***	0.025	7.08	<.0001
Live broiler chickens market price/kg (EGP)	0.048***	0.232	5.01	<.0001
Farmer age (years)	-0.317**	0.115	-2.52	0.012
Feed cost (EGP)	-0.213***	0.126	-5.01	<.0001
Home consumption percent (10-25%, 1; <10%, 0)	-0.264***	1.221	-6.63	<.0001
Mortality rate percent (50-100%, 1; <50%, 0)	-3.885***	0.232	-5.11	<.0001
Group membership (yes, 1; no 0)	0.024^{Ns}	0.034	0.71	0.478
Labor cost (EGP)	0.112^{Ns}	0.003	0.23	0.743
R^2		0.68		
Model Sig.		<.0001***		

Note: NS= non-significant; ** = p<0.01; *** = p<0.001.

the other hand, farmer age, feed cost, home consumption percentage, and mortality rate percentage were the negative influences. Moreover, there is no influence on rural broiler profitability caused by group membership and labor costs.

The estimated coefficient of farmer age was significantly negative (-0.317). However, this shows that productivity declines with an increase in farmers' age. On the other hand, results showed that the estimated coefficient of group membership and labor cost was insignificant because small-scale broiler rearing depends on women or family labor. The estimated coefficients of the value of experience years and education level were significantly positive (0.008 and 0.009, respectively), which means that farmers' experience years and education level were important contributors to small-scale broiler profitability. The estimate coefficient (0.274) for women as flock owners was positive. Also, women as labor contributed a positive coefficient of 0.148 in small-scale broiler profitability. Labor activities involved giving feeds, repairing broiler production assets, and cleaning

the broiler house. The coefficients for veterinary services, extension services, and access to training (0.039, 0.124, and 0.288, respectively) were all positive, showing that farmers who had access to veterinary services, extension services, and training programs had higher production. According to the calculated coefficient of owning credit (0.116), the availability of financing is critical for enhancing small-scale rural broiler profitability. The coefficient of broiler reared flock size (0.001) was positive, which means that a large flock size was important to increase small-scale rural broiler profitability.

The estimated coefficient of adopted management intervention components (0.111) was positive, while the estimated coefficient of feed cost (-0.213) was negative. These indicate a significant difference in small-scale rural broiler profitability between farmers not adopting and farmers adopting management interventions like balanced diets. The value of production rises as farmers embrace more components of the management intervention. For marketing information, live broiler chickens market price/kg, home consumption, and mortality

rate of broiler had estimated coefficients of 0.026, 0.048, -0.264, and -3.885, respectively, which had a significant effect on profitability in the small-scale rural broiler farm.

Major Problems Faced by Small-ScaleRural Broiler Farmers

As shown in Table 4, PFI was determined by the 17 problems mentioned by small-scale rural broiler farmers. PFI readings varied from 240 to 546, with 546 indicating severe problems and 240 indicating moderate problems. To compare the severity of the problems, the rank order was done by decreasing the order of the PFI value of all the problems. The problem of high and unstable prices of day-old chicks ranked the highest and this problem appeared to be a major complaint of the farmers in the small-scale rural broiler production. Followed by the high feed costs, lack quality of day-old chicks, low feed quality, the effect of intermediaries and agents, low live broiler chickens market price, lack of credit support, lack of veterinary services, lack of quality vaccine, unavailability of vaccine, management problems, lack of technical knowledge, lack of extension services, lack of training programs, poor and faraway market, lack of marketing information, and lack of biosecurity were the major problems faced by small-scale rural broiler farmers.

DISCUSSION

Socio-Economic Profile and Institutional Support of Respondent Farmers

The respondent's socio-economic profile had a strong influence on the broiler performance. The results revealed that the majority of respondent producer farmers are women aged 30 to 40 years old, with a nearly overall mean of 11.23 years of experience. Also, most respondents had high education levels and no access to marketing information. In most small-scale rural production, broiler farms receive limited institutional support, such as veterinary service, extension, training services, and formal credit.

The finding is similar to those reported by Kawsar *et al.* (2013) in Bangladesh, reporting that most small-scale broiler producer farmers were educated, and the reared flock sizes by farmers were increased with education level. Moreover, they have mentioned that despite limited veterinary services, extension education, training, and improved knowledge about the management and healthcare of broilers lead to improved productivity. Mendes *et al.* (2014) observed that most small-scale broiler farmers were 31 to 45 years old in Brazil. They also found that nearly 78.02% of the farmers rely on family labor for rearing their flocks. Moreover, nearly 75.53% of farmers attended training programs on production**.** El-Menawey *et al.* (2018) in Egypt have reported that women consented to most flocks' owners and the average farmer's ages were 41.90 years old. The same authors mentioned that the ranges of experiences of the most farmer were 20-40 years. Moreover, most of the farmers had attained intermediate and high education levels; most Egyptian extensive production systems and chicken production received limited institutional support services such as veterinary services, extension services, credit, and training. Also, Hassan (2017) reported in Egypt that the majority of the farmers (58.46%) are in the 31-45 age group, with males outnumbering females (86.92%). Most farmers were educated, with 40% completing secondary school and 33.08% completing high education. Nearly 49.23% of respondents had 6-10 years of experience, with 30.77% having 11-15 years of experience. It was also discovered that most farmers

Table 4. Major problems faced by small-scale broiler farmers in Egyptian rural ranked through index method

Identified problems	Problem's severity				PFI	Score
	SP	MP	LP	None		
High and unstable day-old chicks' price	160	26	14	0	546	1
High feed cost	154	26	20	0	534	2
Lack quality of day-old chicks	134	35	31	0	503	3
Low-quality feed	120	51	19	10	481	4
Middlemen and agents' effects	105	50	45	0	460	5
Low live broiler chickens market price	100	60	26	14	446	6
Lack of credit support	98	54	38	10	440	7
Lack of veterinary services	77	89	24	10	433	8
Lack of quality vaccine	91	54	38	17	419	9
Unavailability of vaccine	80	56	33	31	385	10
Management problems	83	53	27	37	382	11
Lack of technical knowledge	61	50	46	43	329	12
Lack of extension services	68	45	31	56	325	13
Lack of training programs	66	40	33	61	311	14
Poor and faraway market	43	67	40	50	303	15
Lack of marketing information	37	55	26	82	247	16
Lack of biosecurity	57	19	31	93	240	17

Note: SP= severe problems, MP= medium problems, LP= light problems, Non= no problems.

(78.46%) lacked training. The majority of farmers have no access to extension services or financial assistance (87.69% and 85.38%, respectively).

Broiler Productive Performance as a Benefit-Cost Ratio (BCR)

The results of productive broiler performance as a benefit-cost ratio (BCR) showed that most broiler producer farmers (89.50%) had low and medium performances. Our results agree with those found by Ali & Hossain (2010). According to their findings, 78% of small-scale broiler farmers in Bangladesh had low and medium performances, while the remaining 22% had high performances. Moreover, according to Kawsar et al. (2013), in Bangladesh, most small-scale broiler farmers (81%) had extremely low to low performances, about 17% presented medium performance, and only 3% presented high performance. Furthermore, Mendes et al. (2014) discovered that around 64.84% of small-scale broiler farmers in Brazil had poor and medium performances, whereas 35.16% had good performances.

Factors Affecting the Profitability of Small-Scale Broiler Production

The finding of positive coefficients between education (years) and broiler production performance as profitability is similar to that reported by Mendes et al. (2014). They stated that the positive coefficient between education levels and production performance indicates that the farmer who attended school can apply new technology to the broiler production activities, leading to increased profitability. Moreover, the positive coefficient of women as leaders shows that firms dominated by women were more productive than those dominated by males. This might be because more women were involved in the small-scale broiler production and spent more time at home caring for the broilers (Ochieng et al., 2013). The inference is that women earn more than males from small-scale rural broilers. As a result, women should be considered as a starting point for measures to increase the profitability of small-scale rural broiler farms.

The results showed that farmers with access to veterinary services, extension services, and training programs had higher production. These results agree with those reported by Kawsar et al. (2013) in Bangladesh. They have reported that the large training period with high education level and experience leads to better production performances for small-scale rural broiler farms. Moreover, they observed that comparatively large small-scale broiler farm sizes could improve production performance, which led to increased profitability. Moreover, the farmers who used management interventions such as chick separation and balanced feeding diets for chicks increased their family's revenue and profitability (Ali & Hossain, 2010). The coefficients of marketing information, live broiler chickens' market price/kg, home consumption, and mortality rate of broiler had significant effects on broiler profitability. These findings agree with many previous

studies (MOA, 2012) discovering the key market dynamics and profit drivers of the small-scale rural broilers in Swaziland and reporting that the profitability was affected by the selling price of live broiler chicken in a small-scale rural broiler farm. In general, Dutta (2013) in Bangladesh stated that producing small-scale rural broilers was a realistic and efficient industry but that a greater knowledge of the socio-economic characteristics of small-scale broiler farmers in urban, semi-urban, and rural regions was necessary. Moreover, the findings were consistent with those published by Hassan (2017) in Egypt that age, education, experience, farm size, and availability of extension services all benefited broiler output. Furthermore, Etuah et al. (2020) observed in Ghana that labor rate, day-old chick price, and feed price are highly important cost components in broiler production and have a beneficial influence on the profitability of broiler farms.

Major Problems Faced by Small-Scale Rural Broiler Farmers

The biggest problem that appeared to be a major complaint of the farmers in the small-scale rural broiler production was the high and unstable prices of day-old chicks. The present results disagree with those of Kawsar et al. (2013), who reported that the major problem faced by the farmers was a lack of quality chicks. Furthermore, the finding disagreed with those reported by Mendes et al. (2014) that the major problem faced by the farmers was environmental challenges. Our findings on major problems faced by small-scale rural broiler farmers are similar to those reported by Hassan (2017) in Egypt. According to Hassan (2017), the production constraints that were identified and ranked by broiler farmers were disease outbreaks, high feed prices, price instability of both day-old chicks and finishing broilers, extreme weather, management problems, low-quality feed, poor access to extension service, lack of government support, lack of sufficient capital, and lack of technical knowledge. Furthermore, Mendes et al. (2014) in Brazil indicated that poor veterinary services, low-quality feed, a lack of technical service, and incorrect use of technology were the major issues in broiler farming.

CONCLUSION

This study showed that, in general, broiler chicken farms in rural Egypt are small-scale and family driven broiler farms. In the studied regions, farmers presented medium to low financial performance. Even though the importance of rural small-scale broiler farms, there were many factors like socio-economic, access to institutional support, and challenges that are the main problems faced by broiler farmers, resulting in increased costs. The policy recommendations for sustainable production and increased profitability of small-scale broiler farmers in Egyptian rural areas are the authority and development partners should take steps to increase institutional support and encourage youths, especially rural women, to adopt new management technology. In addition, the small-scale broiler farms in Egypt should

be supported with the availability of input supply at an appropriate price.

CONFLICT OF INTEREST

The authors confirm that there is no conflict of interest regarding this manuscript.

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