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Short Communication

THE EFFECT OF FARM SIZE ON PROFITABILITY OF LAYING POULTRY FARMS IN KOSOVO

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Abstract

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After the war of 1998-1999, the Kosovo layer farms went through structural changes. The main objective of this study is to evaluate the effect of farm size on the economic efficiency of Kosovo laying hen farms. Research data are collected through surveys from 36 laying hen farms. Farms were divided into three groups, according to their size, and analysed accordingly. To determine the significance levels of the dependent variables one-way ANOVA, is used. The results of the research showed that higher-capacity farms had a higher egg yield and a better feed efficiency. Results also showed that as farm capacity increased, production cost per egg decreased and the profit margin per egg increased. It was also found that the profit margin were negative for group I and positive for groups II and III. Furthermore, farm size was positively related to economic and technical criteria, and small laying farms were negatively related to high sale prices of eggs.

Key words: laying hen farms; economic size; performance

Introduction

During the war (1998–1999), Kosovo's economy resulted in destroying and unpredictable looting in the social sector as well as in the private sector. Damaged or lost mechanisations reached a rate of 70%, while the production of eggs and poultry meat was terminated (Reçica, 2009). Kosovo has a total area of 10 908 km², with a resident population of 1 804 944 inhabitants, 61% of whom live in rural areas. In a Europe that is increasingly ageing, the population of Kosovo made an exception. Nearly a third of the population are under the age of 15 (Riinvest, 2004). Poultry is one of the most important sub-sectors of animal husbandry, since food products of high quality can be obtained for a very short amount of time, e.g. eggs and meat (MEST, 2013). In Kosovo, of the total amount of poultry, 63% (1 703 954) are laying hens. Kosovo meets 98% of its egg consumption needs. The average consumption per capita is estimated at 200 eggs/year (MAFRD, 2015). Kosovo, as a small market with low local production, is very dependent upon imports (Ibrahimi et al., 2013). Seeing as the price of eggs in Kosovo is higher than in most countries, such as Bulgaria, Romania, Hungary, etc., imports of cheaper eggs are damaging our farmers significantly. Farm size in Kosovo is several times smaller than that of the European Union (MAFRD, 2015) and egg production cost is higher than in other countries (MAFRD, 2016). The purpose of this study was to conduct an economic analysis of laying hen farms of various sizes in Kosovo. In the study, farms of various sizes were compared in terms of performance, subsidies, feed consumption, egg production costs, yield gross profit, net profit, and relative return. In a situation which is associated with low prices due to a high amount of imported eggs the research aim is to find out which farm size can be more persistent towards low prices. This article is the first study to be conducted in the poultry industry in Kosovo which uses production efficiency analysis.

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Data and Methods

The data used in the study were obtained from questionnaires, in total 36 laying farms were observed. Data were collected in 2015, but the gathered information covered a production period that for some farms started in 2014 and for others lasted until 2016. Five municipalities that were intensively involved in poultry farming were chosen to conduct the surveys. Farms were divided into three groups according to the number of hens: farms with 1–2400 laying hens (12 farms) were included in group I; farms with 2401–10 000 laying hens (12 farms) were included in group II; and farms with 10 001+ laying hens (12 farms) were included in group III. The data obtained from farms were analysed with Excel software and are shown in tables. One-way ANOVA, the Grouping Information Using the Tukey Method in Minitab 17 is used to determine significance levels of the dependent variables. Depreciation costs were calculated for buildings (2%) and tool-machine capital (5%) (Erkuş et al., 1995). On the date when the questionnaires were administered, the annual nominal interest rate for loans was 10.56%, as applied by the Republic of Kosovo Agriculture Banks.

In the cost calculation of egg production, since eggs are produced and sold on a daily basis, the revolving fund interest was not calculated (Kıral et al., 1999).

Through the addition of the values of products obtained from laying hen farming, a gross production value was found. By deducting variable costs from the gross production value, gross profit was obtained. Moreover, through the deduction of production costs from the gross production value, net profit was calculated, and with the ratio of the gross production value to production costs, relative return was calculated (Erkus et al., 1995; Rehber, 1993). According to subsidy awarding criteria, farms with 1–2399 layers were not subsidised, farms with 2400–10 000 layers received €0.50 per layer, and farms with 10 000–20 000 layers received €0.40 per layer (ADA, 2014).

Results and Discussion

The performance values of egg production on the analysed farms are given in Table 1. The number of hens per farm was 1563, 5221 and 14 174 in groups I, II and III, respectively ($P < 0.05$). The keeping period of hens in egg production was found to be 59.29, 53.93 and 61.74 weeks in groups I, II and III, respectively ($P < 0.05$). Egg production per one hen was found to be 332.40, 300.35 and 349.4 eggs in groups I, II and III, respectively ($P < 0.05$). The fact that the keeping period of hens was longer in groups I and III might be the reason for the high egg production in those groups. It was found that egg yield was 79.34%, 79.57% and 80.40% in groups I, II and III, respectively ($P > 0.05$). It was observed that the mortality ratio on farms varied between 6.21% and 7.26% ($P > 0.05$).

Feed consumption values of egg production on farms are given in Table 2. The daily feed consumption per one hen is higher (121.96 g) in group I than in other groups (120.60 g in

Table 1
Performance characteristics of hens on farms

Farm groups			
	I	II	III
Number of hen(hen/farm)	$1563^{c} \pm 528$	$5221^{b} \pm 1748$	$14\,174^{a} \pm 3164$
Laying period (weeks)	$59.29^{a} \pm 2.01$	$53.93^{b} \pm 6.16$	$61.74^{a} \pm 6.17$
Number of eggs per farm per day	$16\,324^{c} \pm 4941$	$48\,940^{b} \pm 13\,798$	$160\,573^{a} \pm 44\,976$
Number of eggs per farm during laying period	$495\,266^{c} \pm 146\,392$	$1\,473\,292^{b} \pm 413\,913$	$4\,844\,962^{a} \pm 1\,300\,742$
Number of eggs per hen (egg/hen)	$332.40^{a} \pm 14.32$	$300.35^{b} \pm 28.28$	$349.4^{a} \pm 34.9$
Egg yield (%)	$0.79^{a} \pm 0.19$	$0.80^{a} \pm 0.19$	$0.80^{a} \pm 0.17$
Mortality rate (%)	$6.50^{a} \pm 2.13$	$7.26^{a} \pm 4.46$	$6.21^{a} \pm 2.19$

Means that do not share a letter are significantly different

Table 2
Feed consumption of hens on farms

Farm groups			
	I	II	III
Daily feed consumption (g/hen)	$0.122^{a} \pm 0.010$	$0.121^{a} \pm 0.007$	$0.118^{b} \pm 0.006$
Feed consumption during laying period (kg/hen)	$50.98^{a} \pm 2.98$	$45.58^{b} \pm 4.71$	$50.96^{a} \pm 5.19$
Feed efficiency (kg feed/kg egg)	$2.60^{a} \pm 1.55$	$2.67^{a} \pm 1.79$	$2.37^{a} \pm 0.96$
Feed efficiency (€ feed/€ egg)	$0.72^{a} \pm 0.34$	$0.77^{a} \pm 0.64$	$0.71^{a} \pm 0.31$

Means that do not share a letter are significantly different

group II and 117.92 g in group III) (P <0.05). In the study of Gerzilov et al. (2012) the average feed consumption per day was 118.8 g–121.1 g.

The feed efficiency ratio in physical terms was found to be 2.60, 2.67 and 2.37 and the feed efficiency ratio in economic terms was found to be 0.72, 0.77 and 0.71 in groups I, II and III, respectively (P >0.05).

In Table 3, production costs related to egg production were analysed by classifying production costs as variable and fixed costs. The share of variable costs in the total costs was found to be 82.43%, 72.49% and 74.96% in groups I, II and III, respectively. The share of fixed costs in the total costs was found to be 21.22%, 27.53% and 25.04% in groups I, II and III, respectively. The main reason for the high share of variable costs is that of feed costs.

As indicated in Table 4, it was found that the gross production value of farms increased parallel to farm size (P >0.05). Income from egg sales was the main contributor to the gross production value. The income from egg sales accounted for 94.07%, 92.04% and 93.20% and the discarded hen sales accounted for 5.93%, 5.50% and 5.02%, respectively, of the gross production value and was the second most important contributor.

Gross, net and proportionate profits per one farm and per one hen are given in Table 5. The average gross profit per farm increased parallel to farm size and large farms were more successful than small farms in terms of industry criteria (P <0.05). Gross profit per farm was found to be €6107, €33 661 and €99 856 in groups I, II and III, respectively. Meanwhile, the average net profit per farm was found to be negative in group I and positive in groups II and III (P <0.05). Relative return was found to be 0.97, 1.05 and 1.10 in groups I, II and III, respectively (P <0.05). It means that farms received a €0.97, €1.05 and €1.10 return on each €1 investment according to groups I, II and III, respectively. The fact that group I continue production even though they make a loss can be explained: farms can meet all of the variable costs of the gross production value. In the study area the results per one hen were also calculated. Gross profit per hen was found to be €3.62, €6.16 and €7.13 for groups I, II and III, respectively (P <0.05). Net profit per hen was found to be €-1.01, €0.93 and €2.02, respectively (P <0.05). According to these results, it was found that the net and relative profit per one hen increased parallel to farm size (P <0.05). The fact that the value, variable cost and production cost (euro)

Table 3
Production costs of eggs on farms (euro)

Cost items	Farm groups					
	I	%	II	%	III	%
Feed	$20\ 549^{c} \pm 5686$	65.31	$60\ 078^{b} \pm 17\ 188$	59.83	$187\ 611^{a} \pm 39\ 515$	64.33
Electricity	$460.9^{c} \pm 208.6$	1.36	$1287^{b} \pm 602$	1.28	$3121^{a} \pm 1150$	1.07
Veterinary medication	$220.5^{b} \pm 194.4$	0.65	$548^{a} \pm 413$	0.55	$433.5^{ab} \pm 278.2$	0.15
Cleaning disinfecting	$637^{a} \pm 477$	1.88	$247.9^{b} \pm 129.2$	0.25	$217.2^{b} \pm 114.5$	0.07
Marketing	$1258^{b} \pm 1105$	0.80	$2932^{ab} \pm 2302$	2.92	$4043^{a} \pm 3906$	1.39
Packing	$1582^{c} \pm 468$	4.66	$4706^{b} \pm 1322$	4.69	$15\ 477^{a} \pm 4155$	5.31
Phone cost	$213.6^{a} \pm 110.0$	0.63	$273.1^{a} \pm 164.3$	0.27	$571^{a} \pm 608$	0.20
Water cost	$158.4^{a} \pm 212.6$	0.47	$405^{a} \pm 573$	0.40	$112.8^{a} \pm 204.6$	0.04
Other costs	$2265^{b} \pm 2129$	6.67	$2310^{b} \pm 1377$	2.30	$7005^{a} \pm 6069$	2.40
A. Total variable costs	$27\ 346^{c} \pm 6301$	82.43	$72\ 788^{b} \pm 18\ 998$	72.49	$218\ 592^{a} \pm 52\ 540$	74.96
Building depreciation	$391.4^{b} \pm 248.2$	1.15	$1204^{a} \pm 593$	1.20	$1088^{a} \pm 721$	0.37
Machinery depreciation	$270.3^{c} \pm 110.5$	0.80	$1464^{b} \pm 1198$	1.46	$3174^{a} \pm 1216$	1.09
Permanent labour cost	$0^{b} \pm 0$	0	$4164^{b} \pm 3876$	4.15	$11\ 391^{a} \pm 8175$	3.91
Rental cost of hen house	$0^{a} \pm 0$	0	$0^{a} \pm 0$	0	$2339^{a} \pm 4235$	0.80
Loan interest	$26.8^{a} \pm 49.8$	0.08	$116^{a} \pm 271.3$	0.12	$140.2^{a} \pm 160.3$	0.05
Initial purchase price of poultry	$6517^{c} \pm 2339$	19.19	$20\ 688^{b} \pm 6786$	20.60	$54\ 893^{a} \pm 15\ 763$	18.82
B. Total fixed costs	$7206^{c} \pm 2504$	21.22	$27\ 635^{b} \pm 10\ 076$	27.53	$73\ 025^{a} \pm 25\ 339$	25.04
Total costs (A + B)	$34\ 551^{c} \pm 8264$	103.65	$100\ 423^{b} \pm 28641$	100.02	$291\ 617^{a} \pm 76\ 109$	100.00

Means that do not share a letter are significantly different

Table 4
Income of laying hen farms

Income items	Farm groups					
	I	%	II	%	III	%
Egg sales	31 470^{c} ± 8569	94.07	97 979^{b} ± 31 628	92.04	296 809^{a} ± 78 282	93.20
Subsidies	0^{c} ± 0	0	2610^{b} ± 874	2.45	5669a ± 1265	1.78
Discarded hen sales	1983^{c} ± 539	5.93	5860^{b} ± 1921	5.50	15 970^{a} ± 4250	5.02
Total gross values product	33 453^{c} ± 8628	100	106 449^{b} ± 32 902	100	318 448^{a} ± 79 530	100

Means that do not share a letter are significantly different

Table 5
Gross profit, net profit and relative return on farms

Values (€/Farms)	Farm groups		
	I	II	III
Gross product value	33 453^{c} ± 8628	106 449^{b} ± 32 902	318 448^{a} ± 79 530
Variable costs	27 346^{c} ± 6301	72 788^{b} ± 18 998	218 592^{a} ± 52 540
Production costs	34 551^{c} ± 8264	100 423^{b} ± 28 641	291 617^{a} ± 76 109
Gross profit	6107^{c} ± 5851	33 661^{b} ± 16 467	99 856^{a} ± 39 673
Gross profit margin	16.55^{b} ± 15.39	30.24^{a} ± 6.13	30.78^{a} ±7.77
Net profit	-1099^{b} ± 4404	6026^{b} ± 7357	26 831^{a} ± 21 854
Relative return	0.97^{b} ± 0.14	1.05^{ab} ± 0.06	1.10^{a} ± 0.08
Values (€/Hen)			
Gross product value	21.94^{a} ± 2.11	20.48^{a} ± 1.00	22.55^{a} ± 2.95
Variable costs	18.32^{a} ± 3.95	14.32^{b} ± 1.75	15.42^{b} ± 1.03
Production costs	22.95^{a} ± 3.90	19.56^{b} ± 1.51	20.53^{ab} ± 1.70
Gross profit	3.62^{b} ± 3.58	6.16^{ab} ± 1.16	7.13^{a} ± 2.33
Gross profit margin	16.55^{b} ± 15.39	30.24^{a} ± 6.13	30.78^{a} ± 7.77
Net profit	-1.01^{b} ± 3.41	0.93^{ab} ± 0.98	2.02^{a} ± 1.63
Relative return	0.97^{b} ± 0.14	1.05^{ab} ± 0.06	1.10^{a} ± 0.08

Means that do not share a letter are significantly different

per hen are lower in group II can be due to the short period of production compared to groups I and III.

Egg cost and profit margins of the analysed farms are given in Table 6. Discarded hen sales and subsidies were deducted from the average production costs per farm. The remaining value was assigned to the total egg production and the unit egg cost was calculated. Moreover, by taking the difference between the sales price and the cost of an egg, the profit margin was calculated. It was found that as the farm size increased, the cost of 1kg eggs decreased ($P < 0.05$). The cost of 1kg eggs in groups I, II and III was found to be €1.009, €0.934 and €0.838, respectively. In a study carried out by Horne and

Table 6
Cost and profit margin of eggs on farms

Values (€/Farms)	Farm groups		
	I	II	III
A. Production costs (€/farm)	34 551^{c} ± 8264	100 423^{b} ± 28 641	291 617^{a} ± 76 109
B. Discarded hen sales (€/farm)	1983^{c} ± 539	5860^{b} ± 1921	15 970^{a} ± 4250
C. Subsidies (€/farm)	0^{c} ± 0	2610^{b} ± 874	5669^{a} ± 1265
D. Number of eggs per farm during laying period	495 266^{c} ± 146 392	1 473 292^{b} ± 413 913	4 844 962^{a} ± 1 300 742
E. Egg cost (€/egg) (A-B-C/D)	0.067^{a} ± 0.010	0.062^{a} ± 0.003	0.056^{b} ± 0.003
F. Egg cost (€/kg)	1.009^{a} ± 0.15	0.934^{a} ± 0.05	0.838^{b} ± 0.04
G. Egg sales price (€/egg)	0.065^{a} ± 0.003	0.066^{a} ± 0.005	0.062^{a} ± 0.003
H. Profit margin (€/egg) (H-F)	-0.002^{b} ± 0.010	0.003^{ab} ± 0.004	0.006^{a} ± 0.004

Means that do not share a letter are significantly different

Bondt (2003), the cost of 1kg eggs was reported to be €0.672 in Germany, €0.668 in France, €0.794 in England, €0.603 in the USA, €0.620 in Poland, €0.577 in Ukraine, €0.461 in Brazil, and €0.409 in India. The cost of one egg in groups I, II and III was found to be €0.097, €0.082 and €0.077, respectively ($P < 0.05$). According to the egg sales price, it was found that as the group decrease, the price per egg increases ($P > 0.05$). The profit margin was found to be €-0.002, €0.003 and €0.006 per egg in groups I, II and III, respectively ($P < 0.05$).

Conclusion

Study results indicate that large farms had the highest egg yield, a lower feed consumption, and better feed efficiency ratios. It was found that farm size was positively related to economic, technical and profitability criteria and negatively related to high sale prices. Furthermore, it was found that subsidies did not go against the incentives to follow market signals and increase performance, incentives that are provided by the shift towards a market economy. In the study area, as the farm size increased, gross, net and relative return increased. Profit margin was negative in group I and positive in groups II and III. Moreover, it was found to increase parallel to farm size. Even though medium farms received higher subsidies, they also had the shortest period of production. For this reason, farms in the study should pursue a strategy of enhancing their capacity to become more cost efficient and to access subsidies program. The instability of prices and a high cost of production may force producers to sell their products below their costs. Since cost of feed and cost of raising or purchasing price of a layer were the key factors in production costs, the research suggests that it is more cost efficient to develop specialised farms only for feed production and for raising layers in order to reduce these high inputs prices from imports .

References

ADA, 2014. The Annual Report of Agricultural Development Agency of Kosovo. *Ministry of Agriculture, Forestry and Rural Development* (Al).

Demircan, V., H. Yilmaz, Z. Dernek, T. Bal, M. Gül and H. Koknaroglu, 2010. Economic analysis of different laying hen farm capacities in Turkey. *Agric. Econ. – Czech*, **56** (10): 489-497.

Erkus, A., M. Bülbül, T. Kiral, A. F. Acil and R. Demirci, 1995. Agricultural Economics. Agricultural Faculty, *Ankara University*, Ankara (Tu).

Gerzilov, V., V. Datkova, S. Mihaylova and N. Bozakova, 2012. Effect of poultry housing systems on egg production. *Bulgarian Journal of Agricultural Science*, **18** (6): 953-957.

Horne, P. L. M. and Van Bondt N., 2003. Impact of EU Council Directive 99/74/EC 'Welfare of Laying Hens' on the Competitiveness of the EU Egg Industry. *LEI*, Hague.

Ibrahimi, A., D. Bardić, F. Selimi, G. Živkov**, I. Dulić Marković and N. Doda Gashi,** 2013. Trade of Agricultural Products between Serbia and Kosovo. *Heartefact Fund* (Al). http://www.heartefact.org/wp-content/uploads/2013/03/SRB-KOS_ALB_web.pdf

Kıral, T., Kasnakoğlu H., Tatlidil F., Fidan H., Gündoğmuş E., 1999. Data Base Guide and Production Cost Methodology for Agricultural Products. *Agricultural Economics Research Institute*, Publication No. 37, Ankara (Tu).

MAFRD, 2015. Kosovo's Green Report, *Ministry of Agriculture, Forestry and Rural Development* (Al). http://www.mbpzhr-ks.net/repository/docs/Raporti_i_Gjelber_2015_final.pdf

MAFRD, 2016. Analysis of the Market of Eggs and Poultry Meat. *Ministry of Agriculture, Forestry and Rural Development*, Republic of Kosovo. http://www.mbpzhr-ks.net/repository/docs/Tregu_i_mishit_te_Pules.pdf

MEST, 2013. Ministry of Education, Science and Technology of Kosovo (Al). http://masht.rks-gov.net/uploads/2015/11/blegtoria-e-vecante-final-01-korrik-2013.pdf

Reçica, F., 2009. Structural features of the economy of Kosovo. *Thesis Kosova Journal*, No. 01, 2009 (Al). http://aab-edu.net/downloads/01_2009_04___fet_UJux.pdf

Rehber, E., 1993. Agricultural Management and Planning. Publication No. 84, *Uludag University*, Bursa (Tu).

Riinvest, 2004. Rural Development of Kosovo. *Institute for Development Research* (Al). http://www.riinvestinstitute.org/publikimet/pdf/20.pdf

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