

STUDY ON THE INFLUENCE OF SEVERAL FACTORS ON THE RESULTS OF USING THE MEAT CHICKEN RAISING TECHNOLOGIES

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Abstract

The activity of the enterprises for raising chickens for meat must have a profit that, in a market economy, will ensure the restart of production processes. Therefore, the meat chicken raising technologies have to be designed and applied so that they lead to the achievement of profitable production. The production process performed in view of raising meat chicken is a result of the interaction of several factors. Knowing these factors and the way in which they affect production and costs represents the key premises for preparing the meat chicken raising technologies. The aim of this paper is to show the impact of several technological and economic factors on the financial result obtained following the use of that technology. The analysed factors are: daily average growth, specific consumption, production cost and sales price. The results of the study indicated that the financial result of Dulbanu No 1 farm, Amaru commune, Buzău County has been insignificantly affected by the daily average growth and specific consumption and very significantly by the production cost and sales price.

Key words: correlation, daily average growth, profit

INTRODUCTION

As regards the activity of an economic operator, the economic growth process is highly complex and because of that, it has to take into account the involvement of the information technology factor and a large interdisciplinary study.

The innovation driven technological progress has many effects. It contributes to the improvement of the production systems by increasing labour productivity, causes economies by diminishing the average costs per product unit, limits and diminishes the environmental and social costs by eliminating and controlling the pollution sources. [4]

Any activity targeting the creating of products implies a certain micro-economic framework, capital goods and means to use them, elements prefiguring the content of a technology. The content of a technology reflects the capital goods, the level of knowledge existent a certain moment in time and the way in which the connection of the factors involved in the performance of the technology is obtained. [2]

In general, a technology represents the entire

methods, procedures and processes used in order to obtain a product.

The technology may be defined as being a complex aggregate of knowledge, means and abilities, created in order to obtain a certain product. [4]

In case of agricultural production, the technology bears the mark of this branch of activity in which plants and animals are living organisms with their own necessities regarding growth and development and which undergo a series of changes regarding the shape and sizes. [8]

The Zootechnical Encyclopaedic Dictionary defines the animal farming technology as the science of optimizing, organizing and managing the technological processing with the aim of maximizing the productions and incomes.

The animal raising technology may be defines as a set of processes, methods and technical and organizational measures that are performed in a certain sequence and that are aimed at the meeting of animal needs and offer the possibility of obtaining a high output in economic efficiency conditions. [7]

The farming technology represents a set of

processes, methods, procedures and operations that used during the technological flow offer the possibility to obtain maximal animal production. [5]

Any production technology is performed under the influence of a set of factors. Knowing these factors and the way in which they affect the production and costs represents the key premises necessary in preparing a technology.

The biological material used that is influenced by the heredity factors [9], the raising and feeding methods, the ensuring of micro-climate conditions, the using of preventive sanitary and veterinary measures represent elements of intervention at technical and technological level, but which influence differently the quantity, quality and production cost. [6]

Based on it, the transition from knowledge to action can be performed with the aim of using in a more efficient and proper way the results of investigations, emphasizing the dependency between the production and factors that determine its volume, quality and cost.

The aim of this paper is to show the impact of several technological factors on the financial result obtained following the use of that technology for raising meat chicken.

MATERIALS AND METHODS

The research was based on the results of using the meat chicken raising technology in Dulbanu No. 1 farm, Amaru commune, Buzău County.

This farm belongs to S.C. VOX AGRI S.R.L., Urziceni Municipality, Ialomița County. The basic activity of this farm is raising meat chicken. It has a capacity of 360,000 chicken/day/series for stocking and approximately 1,940,000 of 42 days old chickens weighting 2.78 kg/head.

Dulbanu No. 1 farm of the Meat chicken raising complex belonging to S.C. VOX AGRI SRL has 9 halls and other related buildings, with a capacity of 40,000 animals/hall.

The farm uses free-range farming technology for raising chickens and during the analysed

period has used as biological material the Ross-308 hybrid, a hybrid with special performances.

In order to analyse the results of the farm and to determine the influence of some factors on the results obtained as a result of using the farming technology, the following were used as methods: comparison, index method, correlation method and regression method.

The correlation method is a modern statistical and mathematical method which allows the quantification of the intensity of the relation between one of several factors and an analysed phenomenon between which there are stochastic relations.[3]

This method represents a modern tool which guarantees not only the accuracy of formulating the analysis conclusions, but also the efficiency of the decisions to be taken on this basis, in the real economic activity.

The regression method offers the possibility that, through the regression function, to analyse the way in which the dependent variable behaves in average under the influence of one or several independent variables if all the other variables-cause would have a constant or non-essential influence.

RESULTS AND DISCUSSIONS

Dulbanu No. 1 Farm had a profitable activity during the analysed period, 2011-2013. In each of the three analysed period profit was obtained, the effects being superior to the efforts made (Table 1.).

The incomes have had the following trend: in 2012, they have decreased compared to 2011, with 19%, and in 2013, they have increased with 12% compared to 2011 and with 38% compared of 2012. The increase is due to the fact that in this year, the results expresses through the technical indicators were superior to those belonging to the other two years.

The expenses were lower than the incomes, which allows for a profit to be obtained. It can be noted that the expense increase ratio is lower than the income increase ratio.

The expense efficiency level is reflected by the rate of return. In 2011, it was of 13.9%, in 2012 has decreased to 17.3% compared to

2011. In 2013, the rate of return has increased with 16.5% compared to 2011 and with 40.9% compared to 2012.

Being a farm that uses the intensive, industrial system for the raising of meat chicken, the level of economic efficiency is also given by the labour productivity expressed as the level of profit per m² of premises. It was of Lei 84.4/m² in 2011, then had decreased to Lei 57.7/m² in 2012, the decrease being of 32% compared to 2011 and then has increased to Lei 107.7/m² in 2013. The increase was of 27.6% compared to 2011 and with 87.3% compared to 2012.

The results of applying the technology within the farm are analysed below based of effort indicators, effect indicators and efficiency indicators.

Table 1. Financial results obtained by Dulbanu No. 1 Farm of S.C. VOX AGRI S.R.L. in the period 2011-2013

Specification	U.M	Year		
		2011	2012	2013
Incomes	Thou lei	21,056.4	17,052.2	23,562.2
Expenses	Thou lei	18,479.5	15,290.4	20,274.3
Profit	Thou lei	2,577.1	1,761.8	3,287.9
Rate of return	%	13.9	11.5	16.2
Labor productivity	Lei/m ²	84.4	57.7	107.7

Source: Farm records

Dulbanu No. 1 Farm that uses the technology of rearing mat chicken on permanent litter has a designed capacity of 360,000 per series, with a density of 12 heads/m² according to the European regulation on poultry welfare and an annual nominal capacity of 1,980,000 heads resulted from 5.5 series.

The technical effort employed for the enforcement of the technology can be expressed with the help of the following indicators: number of chicken in stocking and stocking density.(table 2)

The number of chicken entered into stocking in 2011 was with 7.7% higher than the annual nominal capacity of the farm as a result of the fact that six series have been realized. The six series was accomplished by reducing the following.

In the following year, the number of chicken

in stocking was with 9.3% smaller than the annual nominal capacity as a result of the fact that only five series have been accomplished. In 2013, a number of chickens with 4.2% higher than the technological rated capacity has entered into stocking. As in the first year, this year six series has been accomplished.

By comparing the actual stocking density with that estimated by the technology (12 heads/m²), minor negative differences are noticed. Thus, compared to the technological density of 12 heads/m², in 2011, the average stocking density was of 11.6 heads, with 3.3 % lower than the estimated density. In 2012, the stocking density was of 11.7%, i.e. 97.5% of the estimated one, and in 2013, the actual density was with 5.8% lower than the estimated one.

Table 2. Indicators characterizing the meat chicken raising technology used in Dulbanu No. 1 Farm of S.C. VOX AGRI S.R.L. during the period 2011-2013

Specification	U.M	Year		
		2011	2012	2013
Number of chicken entered into stocking	Head	2,132,454	1,796,624	2,062,706
Stocking density	head/m ²	11.6	11.7	11.3
Mortality	%	3.48	3.45	3.27
Delivered chicken	Head	2,058,515	1,734,793	1,995,223
Age of slaughter	Days	49.9	49.1	51.5
Daily average growth	G	40.4	37.6	40.5
Specific consumption	kg fodder/kg of growth.	1.82	1.83	1.69
Chicken on delivery and	kg/head	2.11	1.89	2.13
Quantity of meat delivered per m ²	Kg	23.2	21.6	23.7

Source: Farm records

The effects of applying the technology for raising meat chicken are reflected with the following indicators: mortality percentage, delivered chicken and age of slaughter.

The meat chicken raising technology being an intensive technology it is influenced by the technological risk expressed as mortalities and that affects in a large extent the technical and economic results of the technology.

By the designed technology, the level of mortalities should be of 2% according to the performances of the hybrid.

The effects of the technology applied were the mortalities according to the mortalities specified in the table.

The registered mortality percentages were with 74% higher in 2011, with 72.5% in 2012 and with 63.5%. This actual mortality levels are mainly due to the diseases that may frequency occur in the start-up period.

The number of chicken delivered estimated by this technology takes into account the technological nominal capacity minus the admitted mortalities, resulting 1,940,000 heads/year/farm.

The number of delivered chicken was higher than the level estimated for 2011 and 2013, being with 6% higher the technological one in 2011 and with 2.8% higher in 2013.

In 2012, the number of delivered chicken was with 10.6% lower than the one estimated by the designed technology.

The levels registered for this indicator were due mainly to the number of series, six compared to 5.5 specified by the technology.

The registered age of slaughter was much higher than the one specified by the technology (42 days). The age of slaughter of the chicken was exceeded with 19% in 2011, with 17% in 2012 and with 22.6% in 2013.

The age of slaughter has to be correlated only with the average weight on slaughtering, and not with the delivery pace.

The extension of the age of slaughter results in the increase of the specific consumption. The decrease of the age of slaughter may be obtained by changing the daily average growth, biological material and the fodder recipe.

The following indicators of the technical efficiency of the meat chicken raising technology may be taken into account: daily average growth, specific consumption, average weight of the chicken on delivery and the quantity of meat delivered per m² of premises.

The actual daily average growth was below the estimated level in all the three analysed years. The estimated daily average growth was of 57.9 g according to the hybrid

performances.

The deviations from the estimated technology was of minus 30.2% in 2011, minus 35.1% and minus 30.1% in 2013, the level of this indicator showing the conjugated effect of the action of all the factors influencing the production technology.

The level of efficiency of raising meat chicken is finally influenced by the specific consumption, meaning the quantity of fodder necessary for obtaining one kg of weight gain. The estimated specific consumption for the farm was of 1.72 kg combined fodder/kg of growth.

The actual specific consumption was higher in the first two years and under the estimated level in 2013. In 2011, the specific consumption was 5.8% higher than the estimated consumption, and in 2012, it was 6.4% higher. In 2013, the specific consumption was 1.8% lower.

Another factor that can contribute to the increase of the efficiency of meat chicken raising technology is the average weight of the chicken at the delivery. By the designed technology, the average weight was of 2.47%. The results were below the estimated level with 15% in 2011, 23.5% in 2012 and with 13.8% in 2013.

The average weight at delivery is directly influenced by the daily average growth and the duration of fattening period.

In order to obtain an average weight on delivery in economic efficiency conditions, it is necessary to accomplish an as high as possible daily average growth in an as short as possible period.

The technical efficiency of the meat chicken raising technology may be estimated also by the quantity of meat delivered per m² of premises indicator. The designed technology estimates this indicator at 29 kg/m² of premises.

The applied technology resulted in lower quantities than the ones estimated, representing 80% of these in 2011, 74.5% in 2012 and 81.7% in 2013.

The quantity of meat delivered per m² of premises is directly correlated with the stoking density, specific consumption, daily average growth, age of slaughter, mortalities.

In order to reach deep in the content of production technology and to emphasize more the influence of various factors that in the annual profile may be diminished or blurred, the study has to be detailed for each series of chicken.

Dulbanu No. 1 Farm, that applied the meat chicken raising technologies, obtained 17 series in the analysed period. In 2011, six series was obtained, in 2012, five series and in 2013, six series.

The meat chicken raising technology is influenced by different factors, some of them exogenous type, and other of endogenous type. The results of using the meat chicken raising technology are also influenced by a large number of factors.

The extremely high variability of the technological factors was analysed based on the analysis of variance method.

The indicator, the number of chicken in stocking, has registered an average value of 352,458 heads compared to 360,000 heads, the capacity estimated by the designed technology, deviating from the average with 14,616 heads.

The variation coefficient was of 4.15, representing a low variability of the number of chicken entering the stocking and a satisfactory average (Fig 1).

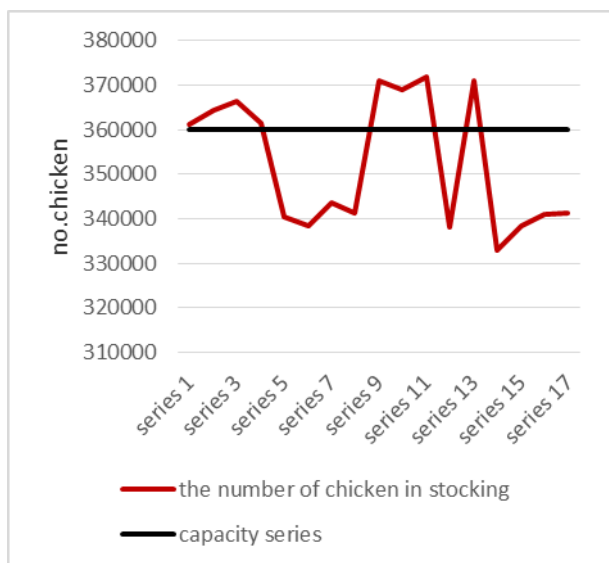


Fig. 1. Evolution of number of chicken entering the stocking per series

The stoking density for the 17 accomplished series has registered an average value of 11.5

chickens/m², with a deviation from the average of 0.5 and a variation coefficient of 4.15, representing a low variability.

The mortalities have registered in general an average value of 3.4%, with a deviation from the average of 0.37% and a variation coefficient of 10.83 %, indicating a quite high variability.

The number of delivered chicken was in average of 340,502 heads for the 17 analysed series, deviation with 14,669 from the average.

The registered variability coefficient was of 4.31%, indicating a low variability (Fig 2).

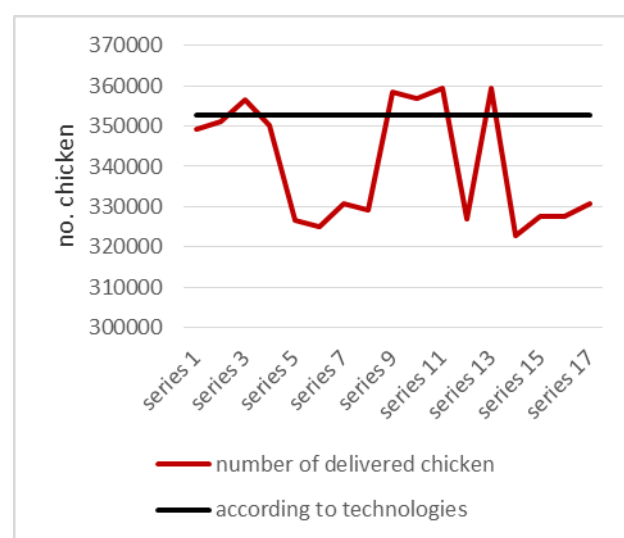


Fig. 2. Evolution of the number of chicken delivered per series

The specific consumption is characterized by a low variability of 7.85%, an average of 1.78 kg of fodder/kg of gain with a deviation from the average of 0.14 kg (Fig. 3).

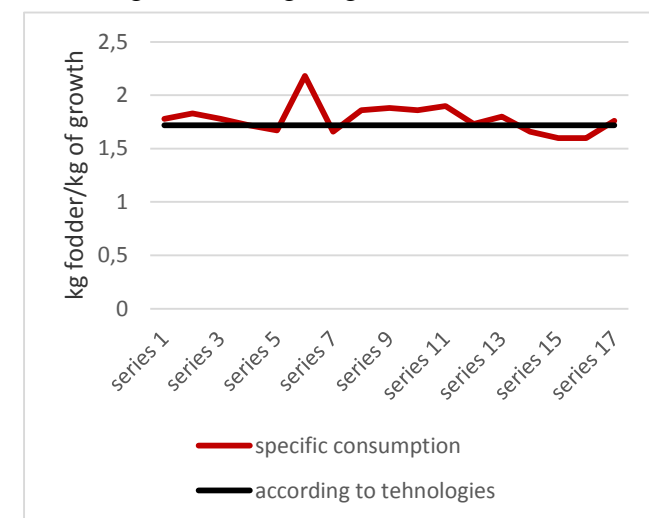


Fig. 3. Evolution of specific consumption/series

The daily average growth as a technical indicator has registered an average value of 39.96 g, with a deviation of 3.08 g from the average and a low variability of 7.7%.

The average weight of the chicken at delivery had an average of 2.06 kg/head, deviating from the average with 0.15 kg and with a variation coefficient of 7.39%.

The quantity of meat delivered/m² of premises has reached, for the 17 series, an average value of 22.9 kg/m², with a deviation of 1.27 kg from the average and a variability of 5.55% (Fig 4).

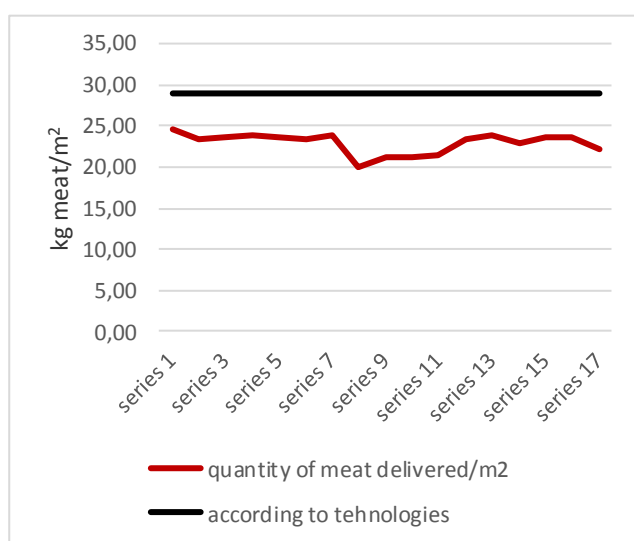


Fig. 4. Evolution of the meat quantity delivered/m² of premises/series

The meat chicken raising technology is an industrial technology and thus, a lower variability is specific to it.

The performed analysis indicates that the registered variability was diminished, as a result of observing the technological and organizational discipline.

At the end, the activity of the meat chicken raising farms has to result in profit, which, in the market economy conditions, ensures the restart of the production process.

Below, there is an analysis of the impact of several factors on the financial result. In this regard, we have identified the following factors that have an important influence of the profit: specific consumption, daily average increase, production cost and sales price. The values of these indicators are summarized in Table no. 3

The methodology used was based on the model of multi-factor linear regression. In the analysed econometric model, profit represents the dependent variable and specific consumption, daily average growth, production cost, sales price represent the independent variables.

For data analysis, statistical analysis methods have been used, with the help of Excel application, Data Analysis module.

The hypothesis of the study are:

I₁ – profit is influenced by the specific consumption;

I₂ – profit is influenced by the daily average growth;

I₃ – profit is influenced by the production cost;

I₄ – profit is influenced by the sales price.

The model that verifies the research hypothesis is of the following type:

$$P_i = a_i + b_1 \times SC_i + b_2 \times DAG_i + b_3 \times C_i + b_4 \times SP_i + c_i$$

Where: P = Profit; SC = Specific consumption; DAG = Daily average growth; C = Production cost; PV = Sales price; c = Error, i = Series from 1 to 17. Results of the model regarding the multi-factor regression are presented in Table 4.

The multiple correlation coefficient (r), with a value of 0.995, is the correlation ratio that indicates the existence of a strong connection between profit and the analysed influencing factors.

The determination coefficient - R-square - has a value of 0.991 and expresses the fact that 99.1% of the profit variation is due to the analysed variables. The adjusted correlation ratio indicates that 0.988 of the total variation is resulted from the regression line, taking into account the number of degrees of freedom.

The F test indicates the role of the independent variables in explaining the evolution of the dependent variable. The value of F test (335.57) and of the materiality threshold (0.0000000000034 < 0.05) indicates that the regression model is valid and may be used to analyse the dependency between the variables (4).

Table 3. The values of indicators representing the results of Dulbanu No. 1 Farm for the 17 series within the period 2011-2013

specification	Profit (thousand lei)	Specific consumption (kg fodder/kg of growth)	Daily average growth (grams)	Production cost (lei/kg)	Sales (lei/kg)	price
Seria 1	734.732	1,780	43.2	3.83	4.81	
Seria 2	508.162	1,830	38.1	4.29	5	
Seria 3	470.707	1,780	36.1	4.09	4.74	
Seria 4	282.713	1,720	43.6	4.21	4.6	
Seria 5	419.018	1,670	42.6	4.26	4.84	
Seria 6	161.743	2,180	44.9	4.83	5.06	
Seria 7	765.552	1,660	40.2	3.78	4.83	
Seria 8	344.743	1,860	38.7	4.48	5.04	
Seria 9	521.22	1,880	36.1	4.34	5.14	
Seria 10	44.891	1,860	36.1	5.76	5.87	
Seria 11	85.395	1,900	37.1	4.95	5.08	
Seria 12	598.96	1,730	39	5.20	6.04	
Seria 13	553.295	1,800	38.8	5.39	6.15	
Seria 14	520.283	1,660	43.2	4.53	5.28	
Seria 15	592.947	1,600	40.7	4.34	5.16	
Seria 16	523.431	1,600	44	4.28	5.01	
Seria 17	499.327	1,760	37	4.89	5.63	

Source: Farm records

Table 4. Results of the regression function

<i>Regression Statistics</i>	
Multiple R	0.99556
R Square	0.991139
Adjusted R Square	0.988186
Standard Error	22.33719
Observations	17

<i>ANOVA</i>					
	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	4	669734.9	167433.7	335.5722042	0.0000000000034
Residual	12	5987.399	498.9499		
Total	16	675722.3			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>	<i>Upper 95%</i>	<i>Lower 95.0%</i>	<i>Upper 95.0%</i>
Intercept	-99.14	158.89	-0.62	0.544332445	-445.32	247.04	-445.32	247.04
Variable 1	-0.02	0.05	-0.34	0.739911669	-0.12	0.09	-0.12	0.09
Variable 2	3.23	1.98	1.63	0.128304273	-1.08	7.53	-1.08	7.53
Variable 3	-733.95	24.78	-29.61	0.000000000001	-787.95	-679.95	-787.95	-679.95
Variable 4	730.30	27.80	26.27	0.000000000006	669.72	790.87	669.72	790.87

Source: Data calculated by the authors

The free term a , with a value of -99.14 is also the point of intersection between the regression line and OY axis. Because t statistic = -0.62 and P - value = $0.544 > 0.05$, this coefficient is significantly different from zero, with the confidence interval $[-445.32; 247.04]$.

The SC variable coefficient, with the value of -0.02 , is negative and indicates the existence of a reverse type connection between profit and specific consumption, meaning that if the specific consumption increases with 10 gram, the profit will decrease with Lei 0,2 thousand. Because P - value = $0.739 > 0.05$, the coefficient is not significant.

The coefficient of DAG variable, with a value of 3.23 , is positive and indicates the existence of a direct connection between profit and daily average growth, meaning that if the daily average growth increases with one gram, the profit will increase with Lei 3.23 thousand. Because P -value = $0.128 > 0.05$, the coefficient is not significant.

The C variable coefficient, with the value of -733.95 , is negative and indicates the existence of a reverse type connection between profit and production cost, meaning that if the production cost increases with Leu 1, the profit will decrease with Lei 733.95 thousand. Because P - value = $0.000000000001 < 0.05$, the coefficient is significant, located within the confidence interval $[-787.95; -679.95]$.

The coefficient of SP variable, with a value of 730.3 , is positive and indicates the existence of a direct connection between profit and sales price, meaning that if the sales price increases with one Leu, the profit will increase with Lei 730.3 thousand. Because P - value = $0.000000000006 < 0.05$, the coefficient is significant, located within the confidence interval $[669.72; -790.87]$.

The results of the created econometric model are influenced by the occurrence of the colinearity phenomenon (1) that occurs when a group of independent variables are strongly correlated between them.

The demonstration of multi-colinearity is performed with the help of the correlation matrix between the independent variable that is presented in Table 5.

Table 5. Matrix of correlation between the independent variables

Specific consumption	1			
Daily average growth	-0.13937	1		
Production cost	0.353308	-0.36382	1	
Sales price	0.072695	-0.37832	0.861558	1

Source: Data calculated by the authors

The analysis of the results indicates that there is a negative and very weak correlation between the daily average growth and the specific consumption.

The correlation matrix also indicated that there is a weak and positive correlation between the production cost and the specific consumption < between the production cost and the daily average growth, the correlation is negative and weak.

The correlation between the sales price and the specific consumption was very weak, but positive; the correlation between the sales prices and the daily average growth is negative and weak.

The sales price has a very strong and positive correlation with the production cost.

Based on the analysis of the coefficients, the following regression model results:

$$P = -99.14 + (-0.02) \times SC + 3.23 \times DAG + (-733.95) \times C + 730.30 \times SP + c_i$$

The results indicate that the study is valid and the profit was influenced insignificantly by the specific consumption and the average daily growth, but it was influenced in a very significant way by the production cost and the sales price.

CONCLUSIONS

The development of the economy required the outlining and emphasizing the practical consequences of specifying and designing technologies aimed to the obtaining of competitive results, both technically and economically.

The production process which is performed in view of obtaining a product is the result between the interactions of a set of factors. Knowing these factors and the way in which

they affect the production and costs represents the key premise necessary in preparing a technology.

Because the result of any business activity in the market economy conditions has to be the positive financial results in order to ensure the continuity of activities it is necessary to design technologies with combinations of factors adapted to the conditions existent at the respective moment.

The research performed indicates that, among the multitude of factors influencing the financial result obtained following the application of meat chicken raising technology, it was influenced at a very high level by the production cost and the sales price and at an insignificant level by the production cost and the daily average growth which can also be found in the sold meat production.

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