Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 14, Issue 3, 2014
PRINT ISSN 2284-7995, E-ISSN 2285-3952

DAIRY BUSINESS: THE CASE OF BULGARIAN DAIRY CATTLE FARMERS

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Abstract

The purpose of the study was to explore differences between dairy cattle farmers in Bulgaria, according to certain factors. Information about the social characteristics of the farmers (educational level, gender, and age), and about the farm characteristics (number of cows in the main herd, average milk yield, and the rate of return on investment) was collected. Sixty percent of the farmers were up to 50 years of age. Fifty percent of the farmers had had a secondary education and the rest had gained a university degree. The study found that only one of the 20 farmers was a woman. It was found that the group of farmers with a university degree had lower average age than the group of farmers with secondary school. There was no significant difference in the rate of return between the two groups of farms in terms of the effectiveness of the farm. The difference in the number of cows in the main herd was not significant too. The research identified a need for additional training for farmers in order to reduce their dependence on hired workers. It was found that farmers attend basic courses in the field of agriculture and livestock breeding in order to fill the gap between the existing levels of knowledge of farmers and the necessary skills for the effective management of dairy farms.

Key words**:** *age, case study research, farmers, education, ROI*

INTRODUCTION

Dairy cattle farming is a promising sector in Bulgaria, and one that creates opportunities for young people to work in rural areas and to engage in agricultural production. The sector also provides opportunities for boosting employment through enterprise development. In that context both a formal and informal education is essential. While there are many studies, concerning the dairy business and the development of rural areas in Bulgaria, the personal profile of dairy cattle farmers has had little research. Little is known about their education, gender, age, the rate of return on investment, the main sources of information and the intended courses from the farmers. Therefore, the study focused on differences between dairy cattle farmers according to certain factors.

Bulgarian dairy farming is still at an unsatisfactory level and during the last decade, there was a steady declining tendency in the number of dairy cattle farms with up to 9 animals. In the same time the number of farms, breeding 10 or more cows gradually rises. The concentration of dairy herds in the country is still low in 2010: the average number of dairy cows in a farm is 5 animals, whilst for the EU this average is 28 [14]. About 49% of dairy cows in Bulgaria are bred in farms with up to 19 animals in the main herd as at November 1st, 2012 [18]. Some of the most important factors holding up the competitiveness of dairy cattle farms in Bulgaria are the poor mechanisation of the production process and obsolete equipment in the majority of small farms [25], as well as the insufficient agricultural experience. The average milk yield of herds in Bulgaria was 3562 l in 2011 [16] whilst for the EU-27 the average milk yield was 6692 kg per dairy cow in 2011 [14]. According to a scientific research, the increase in average milk yield improves the profitability of dairy farms [24].

An analysis of the social and economic characteristics of the rural population is essential to the development of dairy farming. Major problems for the Bulgaria are depopulation and high unemployment rate in rural areas.

The rural population, engaged in agriculture

belongs to social groups with low income, low education and qualifications, and with a higher average age, which limits the ability of farms to choose production solutions [19].

The development of rural areas strongly depends on the agricultural sector [20].

The poor age structure is one of the main problems in agriculture: no more than 5% of all farmers are under 35 years and 55% are over 55 years of age and the majority (95% for 2007) of farms in Bulgaria use family labor [19].

The role of education, according to Bulgarian national statistics [21], can be documented from the point of view of the employment rate. For 2012 the employment rate of the population aged 15 and more years is 69.1% for university graduates; 55% for those with secondary education; 19.3% for people with primary education and 8.4% for people with lower education. Employment is determined primarily by the level of education and professional qualifications [30]. Education is the most important factor for higher employment and the reduction of social disparities and the researches in that field strongly confirm that higher education leads to greater job security and career development [30].

According to the National Human Development Report 2003 [29], measures are needed to encourage investments in non-agricultural sectors in rural regions in Bulgaria, as well as alternative employment outside agriculture. Farmers who are better educated are more likely to consider non-farm self-employment [28]. The motivation of the farmers depends on the economic results from the farm operations, sector prospects and development opportunities. However the economic results are connected to milk and beef production, environmental conditions in the farms [7], including housing system, cleaning, feeding [10], milking, water requirements [2], light conditions [3], heat stress [1], reproduction [8], [9], longevity [11], breeding value of bulls [6], and the health and welfare of animals [23], as well as from the effective management [25] and education and age of farmers [5].

Dairy cattle farming is a labour-intensive sector, in which biological and non-biological processes are intertwined. Effective management and the production of high quality cow milk require a set of resources - both capital and labour. Generally the equipment in small-scale dairy farms in Bulgaria is physically obsolete [25]. Some of the main challenges for the small-scale farmers are connected with an improvement of the average milk yield through the selection and use of high productive cattle breeds, an increase in the concentration of dairy herds and adoption of modern technologies for milking, feeding, cleaning. The role of the manager is to reconcile adequately the farm resources with the market requirements for the production of high quality milk and milk products. It could be achieved by adequate education and qualifications in the field of dairy farming.

One of the main indicators, characterizing the farms' effectiveness is the rate of return on investment. The role of investment for the modernisation and expansion of farms is unquestionable. The planning of operational cash flows and investments in tangible and intangible assets, as well as the optimisation of the production costs, are of paramount importance for the competitiveness of the individual farm and for the competitiveness of the sector as a whole. The profitability of the farms can be improved by reducing the fixed costs per unit of output, which could be achieved by increasing the size of the farm and with investments in new, more productive equipment [19].

The purpose of the study was to explore the differences between dairy cattle farmers in Bulgaria, according to certain factors. The objectives were as followed:

1. To compare dairy cattle farmers according to social characteristics of age and educational level;
2. To compare dairy cattle farmers according to farm characteristics: the number of cows in the main herd, the average milk yield and the rate of return on investment (ROI);
3. To investigate the sources of information, which Bulgarian dairy cattle farmers use and

to specify the main specialised courses, which farmers could use to improve their qualifications.

However the educational level of Bulgarian dairy cattle farmers is still unexplored and that study enters into a new area of knowledge.

MATERIALS AND METHODS

The focus of this study was based on 20 dairy cattle farmers in Bulgaria. The primary information was collected in 2012-2013 through a survey. The data were collected through personal interviews. The respondents were assured that the information would be confidential.

Information about social characteristics of the farmers was collected: (a) education, (b) gender, and (c) age.

The respondents were also asked about the number of cows, the average milk yield and ROI in the farms.

This research belongs to the case study researches [32]. Case study researches build theories [4], confirm or disconfirm a given theory [22] and are used in a variety of disciplines [27].

Although the majority of the studied farmers didn't have agricultural education, the efficiency of the farms, compared to the educational level of the farmers was studied to determine whether the additional years, spent in education had affected the farm performance.

The 20 farms under the study bred a total of 1796 dairy cows.

According to the educational level, the respondents were divided into 2 groups – with secondary education (10 farmers) and with a university degree (10 farmers). And these were the two groups, which were compared below.

A Two-sample t-test was conducted to compare the two independent groups when the dependent variable was quantitative and followed the normal distribution. The nonparametric test - the Mann-Whitney U test [13], [31] was conducted to compare the differences between two independent groups when the dependent variable was ordinal or quantitative but did not follow the normal distribution.

The quantitative variables were tested for normal distribution and for the homogeneity of the variances. The normal distribution was tested with one-sample Kolmogorov-Smirnov test [15] and Shapiro-Wilk test [26]. The Levene's test of homogeneity of the variances was also conducted.

The quantitative variables were the age of the farmers, and number of cows in the herd.

The age: the normal distribution of this variable was not rejected according to the conducted one-sample Kolmogorov-Smirnov test ($p>0.05$) and Shapiro-Wilk test ($p>0.05$). The normality of each group of the analysed variable was verified. Here the normality assumption was acceptable.

The number of cows: the two groups within the variable were not normally distributed, according to the significance of the one-sample Kolmogorov-Smirnov test ($p<0.05$) and Shapiro-Wilk test ($p<0.05$).

The farmers were asked to indicate in which group, in terms of ROI, their farms fall within: Group 1 - from 1 to 10% (lower rate of return) and Group 2 - more than 10% (higher rate of return). Group 1 was less favorable than Group 2 and that was the reason why ROI was classified as an ordinal variable.

A Two-sample t - test was used to compare the age of farmers by their educational level. The test compared the age of farmers with a secondary education with the age of farmers with a university degree. The t - tests were performed, after homogeneity of the variances was verified with Levene's test ($p>0.05$).

The nonparametric Mann-Whitney U test was used to compare ROI by the educational level of farmers, because the rate of return on investment was an ordinal variable. Mann-Whitney U test was also conducted to compare the number of cows in the main herd, because the number of cows in the two groups, formed according to the educational level of farmers weren't normally distributed, according to the one-sample Kolmogorov-Smirnov test ($p<0.05$) and Shapiro-Wilk test ($p<0.05$).

RESULTS AND DISCUSSIONS

The results from the research were as followed:

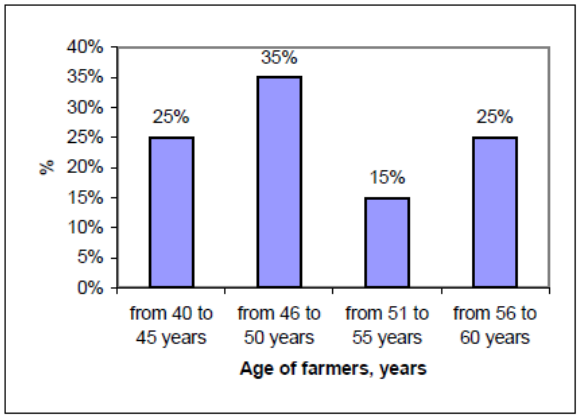

Fig. 1. Distribution of Farmers according to Their Age, N=20

Figure 1 shows the distribution of the farmers according to their age. The age of farmers varied from 40 to 60. It was found that 35% (*n*=7) of the respondents were within 46 - 50 age group, followed by the two groups - between 40 to 45 years (*n*=5) and between 56 - 60 years (*n*=5) with equal percentage (25%); 15% (*n*=3) were within 51- 55 age group.
The study found that one of the 20 farmers was a woman, which was consistent with the conclusion of a scientific research [30], according to which mainly men are engaged in the Bulgarian agriculture and women are mostly involved in the service sector.

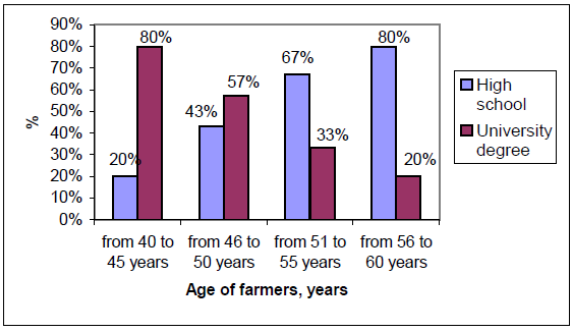

Fig. 2. Educational Level of Farmers according to Their Age, N=20

Figure 2 shows the educational level of the farmers according to their age. The majority of the respondents between 40 and 45 years of age and between 46 and 50 years were university graduates (80% and 57% respectively). In the age groups: between 51 and 55 years and between 56 and 60 years predominated farmers with a high school diploma (67% and 80% respectively). Two of the respondents with a university degree had a diploma, connected with agriculture or animal breeding (one farmers was a veterinarian and one was an agronomist). This result was consistent with the conclusion of a scientific research [19], according to which despite the relatively high level of public education of the farm managers (secondary or higher education) in the majority of farms, the agricultural experience of the managers is low. This conclusion was confirmed by the results from the survey, held in 2010 [17], which stated that 96.58% of farm managers had only practical agricultural experience, 2.08% had secondary educational degree in agriculture and 1.34% had higher educational degree or postgraduate degree in agriculture.

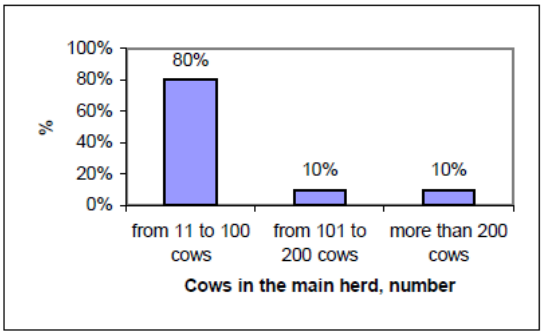

Fig. 3. Distribution of Farms according to the Number of Cows in the Main Herd, N=20

Figure 3 represents the distribution of farms according to the number of cows in the main herd. Between 11 and 340 cows in the main herd were bred in the studied farms. Eighty percent (*n*=16) of the farms fall within 11 - 100 cows category, followed by the group between 101 and 200 cows (*n*=2) and the group with more than 200 cows (*n*=2) with equal percentage (10%).
Table 1 represents descriptive statistics of the number of cows in the main herd, the age of the farmers, and average milk yield of the farms. The average age for all farmers was 51 years; for university graduates – 47 years, and for the farmers with high school – 53 years.

Table 1. Descriptive Statistics of the Variables: Number of Cows in the Main Herd, Age of the Farmers, and Average Milk Yield

Variable	Number of observations	Minimum	Maximum	Mean	Standard deviation
Number of cows	20	11	340	90	88
Age - all farmers	20	40	60	51	6
- Age - university graduates	10	40	60	47	6
- Age - high school	10	41	60	53	6
Average milk yield	20	3000	7800	5740	1466

The average number of dairy cows for a farm was 90. The standard deviation was 88 for the number of cows and 6 for the age of farmers. The average milk yield for the studied farms was 5740 kg with standard deviation 1466.

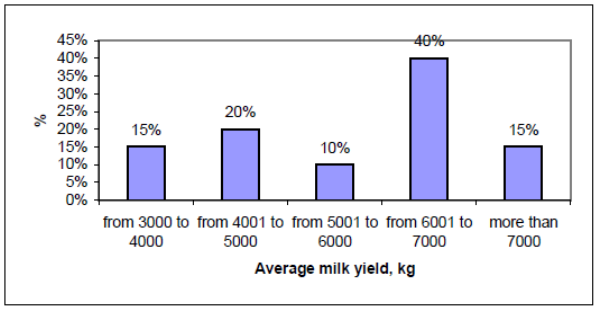

Fig. 4. Distribution of Farms According to the Average Milk Yield, N=20

Figure 4 represents the distribution of farms according to the average milk yield. Forty percents (*n*=8) were with 6001-7000 kg category; and 15% (*n*=3) had higher than 7000 kg average milk yield. The rest (45%) had average milk yield between 3000 and 6000 kg.

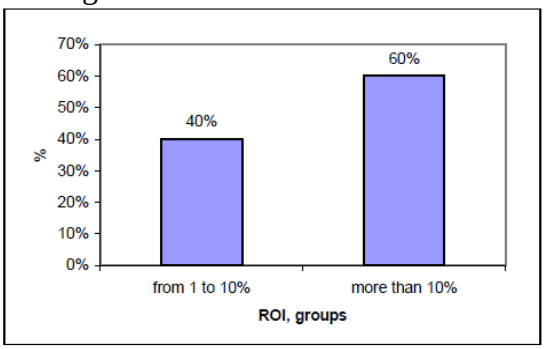

Fig. 5. Distribution of Farms According to ROI, N=20

Figure 5 represents the distribution of farms according to ROI. The study found that 40% (*n*=8) of the farmers had a realised ROI from 1 to 10% and the rest of farmers had higher rate of return.

The results from the conducted statistical tests showed that the difference in the age between the two groups of farmers (first group – with secondary education, second group - with a university degree) was significant ($p = 0.048$). The average age of farmers with a secondary education was 53 years, and for those with a university degree was 47 years. There was not a significant difference in the number of cows in the main herd ($p = 0.796$), as well as in ROI between the two groups ($p = 0.481$).

Access to information was crucial for the proper functioning of the farms. Successful farm managers seek active information [12]. From the analysis of the data it was found that the farmers mainly informed themselves, in the field of dairy production, by specialised literature, television, internet, from consultations with other farmers and experts (veterinarian, accountant, business partner), and from seminars on topical issues. The majority of young farmers increase their qualification through consulting services and reading specialised literature [25].

The respondents often faced problems in recruiting and retaining their workforce. In order to reduce their dependence on hired workers and specialists in agriculture, most of the farmers completed specialised courses for agricultural producers, courses for artificial insemination techniques for farm animals, training courses necessary to work with farm machinery and agricultural equipment, and computer literacy courses. The courses increased their knowledge and managerial abilities and the farmers themselves implemented some of the key activities, such as insemination of animals, some of the mechanised agricultural processes and others. From this perspective, the additional training is extremely important for the cost-effective operation of the farms. This research was consistent with the conclusion of a scientific research [19], according to which cost reductions in farms can be achieved through the use of farmer's own labour.

CONCLUSIONS

The majority of studied farms bred between 11 and 100 cows in the main herd (80%) and only 10% had more than 200 cows. Farmers with a university degree on average were

younger than the farmers with secondary school. From the studied 20 farmers, one was a woman.

There was no significant difference in ROI between the two groups of farms in terms of the effectiveness of the farm. The difference in the number of cows in the main herd was not significant too. The research identified a need for additional training for farmers in order to reduce their dependence on hired workers.

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