Assessment of Deer Breeding Industry from the Viewpoint of Producers

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Abstract. A survey of producers engaged in deer-breeding industry was conducted to assess the present situation in deer-breeding industry in Latvia and to determine whether it is a prospective industry along with traditional agricultural industries in the future. The research aim was to ascertain the opinion of deer breeders on the factors affecting the development of deer-breeding industry in Latvia. The survey was performed in 2011. A sample population consisted of farms rearing red deer *(cervus elaphus)* or fallow deer *(dama dama)* for meat, animal selection, reproduction, or recreation. Totally, 86% of deer farms in Latvia were questioned in the survey. The data obtained were processed by employing Microsoft Excel statistical methods.

One can conclude from information gained from the respondents that there are significant differences in the areas of deer farms and the number of animals. Of total farms, 50% had a fenced area of less than 99 ha, 40% - had a fenced area within a range from 100 ha to 350 ha, and only 10% or 4 farms had a fenced area of more than 350 ha. The number of deer ranged within 1-100 on 60% of the farms, on 28% of the farms it was within 101-350, and on 12% of the farms the number of red deer and fallow deer exceeded 350 animals. In the group of medium and large farms, the largest income (56% and 70%, respectively) was gained from meat production, while the main source of income of small farms was sales of live animals (37%). As regards sales possibilities of products of deer farming, the respondents view the domestic market as significant (8.9±1.56), at the same time they point that the sales possibilities for deer meat are limited (7.80±2.10), and deer meat processing possibilities (7.70±1.42) and the market of deer meat are not sufficiently developed (8.30±1.34). According to them, the main factors hindering the development of the industry are product quality (8.90±0.88), development of the market of deer meat (8.30±1.34), availability of financial resources (8.10±0.88), and herd size on farms (8.1±1.20).
Key words: deer farming, market, produce.
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Introduction

An increased interest of both producers and consumers has been observed for several years for a non-traditional agricultural industry – deer farming, which supplies meat of hunted animals to the Latvian market. The number of farms, on which red deer or fallow deer are registered, has risen 2.3 times during the recent ten years. In 2010, the State Forest Service granted 70 permits for keeping red deer and fallow deer on farms (VMD, 2011; LDC, 2011). As regards the existing deer farms, which intensively farm red deer, fallow deer, and other wild animals, at the end of 2010, there were 42 such farms, of which 26 were members of the Latvian Wild Animal Breeders Association (SDAA, 2011). The total fenced area of deer farms was approximately 8000 ha. The basic species kept on these farms were red deer – 66% and fallow deer – 12%, among other species were moufflons – 6% and wild boars – 6%, while other species accounted for 10% of their total number (SDAA, 2011).

In the context of the Baltic States, it has to be noted that published information on deer farms in Estonia is not available. The first deer farms and deer breeders associations were founded in Latvia and Lithuania in the 1990s (FEDFA, 2011). In 2010, totally 150 deer farms were registered in Lithuania (Deer Farmers Association …, 2011), which exceeded the number of farms registered in Latvia several times. Yet, the average number of deer per farm in Latvia indicates that its deer-breeding

industry is purposefully developed. In 2010, the average number of deer per farm in Latvia was 169 (SDAA, 2011; LDC, 2011), while in Lithuania, the respective indicator was only 26.7 in 2010 (Deer Farmers Association …, 2011). Besides, it has to be emphasised that 62% of the functioning deer farms in Latvia are members of the Latvian Wild Animals Breeding Association (SDAA, 2011), whereas only 29 deer farms in Lithuania or 19% of their total number have joined their deer breeders association (Elniu augintoju asociacija - *in Lithuanian*).

These facts indicate the development of a new industry in Latvia, which causes many questions concerning production, production and processing efficiency, sales market size and assortment, expected domestic and foreign demand for deer meat etc. Studies on biological aspects of deer farming are available in literature including animal health, feeding, welfare, in both Latvian publications (Jemeljanovs, Miculis, 1998; Paeglitis et al., 2006; Skriba, 2011) and research papers of foreign scientists (Fletcher, 1989; Tuckwel, 2003), but there are a few studies on economic aspects of deer farming and market issues on Latvian conditions.

In the leading deer-breeding countries – New Zealand, Australia etc. – deer farming is one of the traditional agricultural industries, at the same time it has to be taken into consideration that climatic conditions in these countries significantly differ from those in Latvia. Therefore, studies in these countries may not

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often be applied to a respective development stage of deer farming in Latvia. The situation in deer farming in the nearest neighbouring countries – Lithuania and Estonia – is similar to that in Latvia. Studies on deer farming are fragmented and unsystematic in these countries (Baltrunaite, 1999), and in Latvia, the situation is also the same. Such a situation hinders the development of the deer-breeding industry. It means that Latvia has to implement consistently its own policy in deer farming and raise the professional level in it.

Therefore, it is necessary to ascertain the present situation in this industry and to determine whether it might be prospective in the future along with non-traditional agricultural industries, mainly, from the viewpoint of producers engaged in deer-breeding industry.

The research aim is to ascertain the opinion of deer breeders on the factors affecting the development of deer-breeding industry in Latvia.

The following research tasks are set to achieve the research aim:

1) to assess the key physical indicators of deer farms (area, number of animals etc.);

2) to analyse the financial performance indicators of deer farms;

3) to investigate the factors promoting and hindering the development of deer-breeding industry in the future.

Materials and methods

Within the present research, deer farming is defined as a multifunctional non-traditional agricultural industry oriented towards animal selection and rearing, meat production, hunting and tourism, thus, increasing the economic return of the industry. Unpublished information of the Latvian Wild Animal Breeders Association, research papers and conference materials of Latvian and foreign scientists, and interviews with the industry's experts were used in the present research. Information on traditional agricultural industries, quantities produced, and market volumes is regularly compiled, summarised, and published by various institutions, while information on non-traditional agricultural industries and their product market is not published. Therefore, published information on non-traditional agricultural industries, including problems of and studies on deer farming, is actually not available. Since the deer-breeding industry is a relatively new industry not only in Latvia but also in the world, the primary data were obtained by employing a quantitative research method – structured individual interviewing to achieve the research aim. A questionnaire was developed to survey businessmen engaged in deer-breeding industry according to Churchill et al, 2010 and Aaker et al, 2007.

The survey was conducted in the summer-autumn period of 2011. Both open and closed questions on the economic and financial performance of deer farms and development of the industry were included in it. The sample population included farms that reared red deer (*cervus elaphus*) or fallow deer (*dama dama*) for meat, animal selection, reproduction, or recreation. The survey covered 36 deer farmers, i.e. 86% of intensive deer farms in Latvia in 2010. The data obtained were processed by employing Microsoft Excel statistical methods.

Results and discussion
1. Characteristics of deer farms

During the research, it was ascertained that 40% of respondents had been engaged in deer farming for a period of 9-18 years, while the majority or 60% of respondents pointed that this had been their business for as many as 3-8 years.

A significant characteristic indicator of any farm is its area, while a significant indicator of a deer farm is a fenced area for deer. In terms of area of deer farms, huge differences are observed among such farms in Latvia. A fenced area of a deer farm is on average 156 ha. By constructing a percentile distribution, percentages of all values below the value of sample were determined (Arhipova et al., 1997; Arhipova, Balina, 2006). By calculating the median (Me) and percentile P_{50} of the sample, it was determined that 50% of farms had a fenced area of less than 99 ha ($P_{50}=Me=99$); 40% of farms had a fenced area within a range of 100 to 350 ha, and only 10% or 4 farms had a fenced area of more than 350 ha ($P_{90}=350$).

After analysing the herd size of respondents' farms, one could conclude that this indicator, too, significantly differed among the farms. On average, there were 192 animals per farm. After constructing the percentile distribution, one could conclude that the number of deer ranged within 1-100 ($P_{60}=100$) on 60% of farms. In total, there were 791 animals in this farm group or 11% of the total number of animals. Yet, on 28% of the farms, the number of deer was within 101-350 with a total number of 2138 animals in this farm group or 29% of the total number of animals. Only on 12% or 5 farms, the herd size of red deer and fallow deer exceeded 350 animals ($P_{88}=350$) with a total number of 4363 animals in this farm group or 60% of the total number of animals.

Further, in the research, considering the area of fenced pastures and the number of animals, the farms were conditionally classified into three groups: small (pasture area from 1 to 99 ha), medium (pasture area from 100 to 350 ha) and large (pasture area of more than 350 ha). The total fenced area of small farms totalled 965 ha or 16% of the total fenced area, in the group of medium farms this area amounted to 2829 ha or 48% of the total fenced area, and the total fenced area of large farms was 2136 ha or 36% of the total fenced area for deer.

To assess the development trends in the industry in general, it was important to find out why the respondents were engaged in such a non-traditional agricultural industry. The reasons for it were very diverse, yet, there were several reasons given by the respondents most often: 28% of respondents believed that deer farming was a potentially profitable kind of business, 8% - pointed to risk reduction in the result of diversifying their business, 12% - kept deer with the purpose of preserving the species, while aesthetic satisfaction for themselves and their family was mentioned in 15% of questionnaires. Part of the respondents mentioned that their establishment of a deer garden related to enhancing the landscape value of their rural real estate, small labour investments, a sportsmanlike lifestyle, an aristocratic lifestyle, and the majesty of animals.

As regards the specifics of this agricultural activity, it was found out that part of the respondents related their

activity to farming animals for meat (63%), selection (55%), trophy hunting (66%), sale of live animals (50%), and tourism and recreation (63%). It has to be noted that the mentioned indicators did not sum up, as the largest part of these farms specialised in several activities.

2. Financial performance indicators of deer farms

Since the respondents pointed to several specialisations of their farms: meat production, selection, trophy hunting etc., it was found out which specialisation contributes most to gross revenues of deer farming.

As one can see in Table 1, the share of revenues gained from various specialisations differs among the farm groups. The highest share of revenues from meat production is observed for the groups of medium and large farms, 56% and 70% of total gross revenues from deer farming, respectively. For these farm groups, sales of live animals produce 20% and 15% of their total income, respectively; whereas, income from trophy hunting (8% and 5%, respectively) and tourism (16%

and 10%, respectively) make the smallest contributions to their total income.

Income gained from farming animals for trophy hunting is presently quite insignificant, since on average these farms do this business for 9 years. In the process of selecting animals for hunting, only those animals, which can produce a valuable trophy, i.e. beautiful horns at the age of 7-9 years, after being hunted are selected and reared. Yet, the small farms gain their main income from selling live animals (37%) and meat (28%), and tourism (21%). The insignificant share of income from sales of meat relates to the fact that only prospectless and defective animals are sold for meat in this farm group.

The industry's viability, to a great extent, depends on the wish of businessmen themselves to expand their existing specialisation. Opinions of the respondents on possibilities for increasing their herd size and pasture area were found out in the present research.

Increasing the herd size of deer by means of high quality breeding animals is a significant factor for the economic growth of a farm. Reproducing and increasing a

Table 1

Share of gross revenues by type of deer-breeding industry products (%)

Production specialisation	Small farm group	Medium farm group	Large farm group
Meat production	28	56	70
Sale of live animals	37	20	15
Recreation/tourism	21	16	10
Trophy hunting	4	8	5
Other	10	0	0

Source: author's calculations

Table 2

Ratings of the deer-breeding industry and deer meat production

Assertion	Average	min	max	SD*
Deer farming may be regarded as a profitable industry	6.70	4	10	1.89
Deer farming is a significant non-traditional agricultural industry	7.30	5	9	1.57
Deer farming may become a traditional agricultural industry	3.90	1	8	2.23
Deer meat may become an available alternative to traditional meat in the near future	5.50	2	8	2.22
Deer meat prices have to be equal to beef prices	3.20	1	7	2.04
Deer meat prices have to be lower than beef prices	1.90	1	4	1.10
Deer meat products have to be a special type of products (niche products)	6.20	4	9	1.48
Production of deer meat ensures the viability of farms	5.90	3	8	1.60
Deer meat market prices ensure sufficient interest of consumers in these products	5.70	2	9	2.50
Sales possibilities for deer meat are limited	7.80	4	10	2.10
Majority of deer products are sold on the Latvian market	8.60	6	10	1.56
Deer meat and products are sold directly to consumers	7.90	3	10	2.08
Deer meat and products are sold by means of retailers	5.80	1	9	2.26
Deer meat and products are sold to restaurants	7.60	5	9	1.69

* Standard Deviation

Source: author's calculations.

herd also depends, to a great extent, on the specialisation of a deer farm – rearing pedigree animals, meat production etc. It was found out that over the recent 5 years, for the reproduction of a herd, breeding animals were purchased from other deer farms in Latvia in 45% cases and from abroad in 33% cases. However, during the recent year, breeding animals available on one's own farm were mostly (69%) used for the reproduction of herds. It allows concluding that presently deer farms are provided with breeding animals of sufficient quality to reproduce their herds.

3. Development possibilities for deer farms in the future

Since the majority of deer farms were small, it was found out whether the respondents planned to increase their farm size and/or herd over the next 5 years. Thus, whether the farms would develop further and the entire industry would grow. Increasing a herd is affected by a rational proportion of deer of various ages and both genders in the total number of herd animals.

The largest share of the respondents or 52% planned to increase their fenced area and number of animals, while 36% - planned to manage their farms as before, but 4% - planned to stop this business or had already stopped farming deer. It is worth mentioning that 8% of respondents said that due to various reasons, they were not able to increase the size of their herd in the near future, but on favourable conditions, they believed it was possible.

It has to be noted that the medium and large deer farms planned to increase significantly the size of their business, the main purpose of which was meat production and rearing of animals for trophy hunting. Yet, the small deer farms wished to keep their business at the same level, as their priority specialisations were animal selection and tourism.

At the end of the survey, the respondents were asked to rate assertions on deer-breeding industry. The results are summarised in Table 2.

Their rating scale ranged from 1 to 10, where 1 meant "I absolutely disagree" and 10 meant "I absolutely agree". The respondents' opinions on the given assertions were quite diverse, and the range of ratings proved it (see min and max ratings in Table 3). A general trend indicated that the respondents agreed with an assertion that deer farming was a significant non-traditional agricultural industry (7.30±1.57), besides, they believed that deer farming might be regarded as a profitable industry (6.70±1.89). A possibility of deer-breeding industry to

Table 3

Ratings of the factors affecting deer-breeding industry

Factors	Average	min	max	SD*
Climate	5.80	3	9	1.81
Costs of fencing	6.90	4	9	1.66
Costs of product processing	5.30	3	8	1.49
Costs of labour	5.60	2	9	2.37
Veterinary cost	5.00	2	8	2.26
Costs of feed	5.60	3	8	1.58
Construction of place for animal pre-processing	6.40	4	9	2.01
Costs of purchase of breeding animals	7.90	5	10	1.45
Farm expansion possibilities (purchase or rent of land)	7.60	5	10	1.65
Herd size	8.10	6	10	1.20
Deer meat processing possibilities	7.70	5	9	1.42
Location of place of product processing (distance)	5.30	2	9	2.06
Product quality	8.90	8	10	0.88
Deer meat price	7.50	4	10	1.72
Market of deer meat and other products is not developed	8.30	6	10	1.34
Animal welfare standard	6.60	4	9	1.90
Insufficient cooperation between deer meat producers	6.80	3	10	2.25
Vandalism	2.60	1	5	1.43
National and the EU support policies	7.50	5	10	1.58
Availability of labour	5.70	4	9	1.70
Insufficient knowledge on specifics of the industry	7.10	5	9	1.45
Entrepreneurial ability	7.30	5	9	1.42
Availability of financial resources	8.10	7	10	0.88

*Standard Deviation

Source: author's calculations

become a traditional agricultural industry was rated low (3.90±2.23).

As regards deer meat production, the respondents believed deer meat products had to be niche products on the market (6.20±1.48). It was, in its turn, related to the respondents' opinion on possible deer meat market prices. The respondents quite unanimously disagreed with an assertion that deer meat prices had to be lower than beef prices (1.90±1.10) and partially disagreed with an assertion that deer meat prices had to be equal to beef prices (3.20±2.04).

The respondents' opinions were different regarding the interest of consumers in deer meat products (see min, max ratings in Table 3). Yet, in general, one can say that the respondents believed that deer meat prices were sufficiently attractive to consumers (5.70 ±2.50).

The deer-breeding industry is presently at the stage of growth. Therefore, the market of products of deer farming is not developed as well. The respondents pointed that sales possibilities for deer meat were limited (7.80±2.10).

According to the respondents, one can conclude that Latvian products of deer farming are oriented towards the domestic market (8.9±1.56) and mostly sold to restaurants and in direct selling – from the producer to the consumer. In direct selling, to some extent, deer meat producers can guarantee high quality for their products. The extension of direct selling channels is necessary to sell deer meat, as a large number of middlemen slow down the movement of products from the producer to the consumer (Praude, Belcikovs, 1999). It means, the more middlemen are in business, the smaller is the control of producers over the quality of products reaching their consumers. However, such an approach hinders the development of the industry in general. It is required to extend the sales channels, as part of consumers are insufficiently informed about possibilities to buy deer meat, prices of deer meat and its products are quite high, and sales of these products are not well-organised in retailing. Yet, at the same time, consumers are interested in knowing where to buy deer meat, visiting animals, and trophy hunting.

During the survey, the respondents rated the factors hindering the development of deer-breeding industry in the scale from 1 meaning "I absolutely disagree" to 10 – "I absolutely agree". After summarising the ratings provided by the respondents, the most significant factors affecting the deer-breeding industry are presented in Table 3.

The ratings provided by the respondents and analytical calculations indicated that the most significant factors affecting the development of deer farming were product quality (8.90±0.88) and undeveloped market of deer meat (8.30±1.34). The ratings on these factors were quite unanimous, and the small range of ratings in the respective items proved it (see min, max ratings in Table 3).

The respondents regarded the following factors as significant for the development of the industry: availability of financial resources (8.10±0.88), herd size on a farm (8.1±1.20), cost of purchase of breeding animals (7.90±1.45), deer meat processing possibilities (7.70±1.42), farm expansion possibilities (7.60±1.65), national and the EU support policies (7.50±1.58), and deer meat prices on the market (7.50±1.72).

The respondents regarded various costs related to business activity, except the construction and maintenance costs of fenced area, as less significant problems. A medium significant problem, according to the respondents, was the availability of labour (5.70±1.70), which was a problem in rural areas where low economic activity had caused the outflow of labour from rural areas. It has to be noted that the respondents regarded the insufficient knowledge of businessmen and experts engaged in the industry on the specifics of deer-breeding industry as a significant factor affecting the development of this industry (7.10±1.45).

The account and ratings of problems indicate that systematic processing and sales of deer meat are not developed in Latvia. Therefore, it is necessary to establish a deer meat processing company. The development and expansion possibilities for the market of products of deer farming and on assuring the quality of products in the entire food chain from the production, processing, and delivery of deer meat to the consumer as well as educational seminars on deer farming require further studies.

Conclusions

1. In terms of area of deer farms and number of animals, huge differences were observed among these farms. Of total farms, 50% had a fenced area of less than 99 ha, 40% - had a fenced area within a range from 100 ha to 350 ha, and only 10% or 4 farms had a fenced area of more than 350 ha. The number of deer was 100 on 60% of farms, on 28% of the farms it was within 101-350 with a total number of 2138 animals in this farm group. The herd size of red deer and fallow deer exceeded 350 animals on 12% of the farms.
2. In the group of medium and large farms, the largest income (56% and 70%, respectively) was gained from meat production, while the main source of income of small farms was sales of live animals (37%).
3. As regards the market situation for products of deer farming, the respondents believed that Latvian products of deer farming were mostly oriented towards the domestic market (8.9±1.56), at the same time they pointed that the sales possibilities for deer meat were limited (7.80±2.10) and deer meat processing possibilities (7.70±1.42) and the market of deer meat were not sufficiently developed (8.30±1.34).
4. The most significant factors affecting the development of deer farming are: product quality (8.90±0.88), development of the market of deer meat (8.30±1.34), availability of financial resources (8.10±0.88), and herd size on farms (8.1±1.20).
5. It is necessary to establish a deer meat processing company and conduct studies on the market volumes and assortments for the market of products of deer farming to provide the systematic processing and sales of deer meat.

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