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ANALYSIS OF BUFFALO BREEDERS' DECISIONS IN TURKEY WITH ANALYTICAL HIERARCHY PROCESS

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Buffalo breeding is a prominent economic activity in many districts of Tukey. It is important to note that buffalo breeding requires specific treatment and knowledge when compared with other animal breeding activities. Departing form this point of view, it was intended to measure factors affecting buffalo breeders' motivation and willingness and their attitudes in Afyonkarahisar, Bitlis, Diyarbakır, Istanbul, Mus, Tokat and Samsun provinces of Turkey. Effective factors considered were socio-demographic characteristics of buffalo breeder and breeder's family, characteristics of the breeding enterprises, needs of breeders and supports provided to buffalo breeding. The main motivation was to seek the decision process where development of buffalo breeding is accepted and approved. Accordingly, data retrieved from 462 buffalo breeders via face to face survey was analysed with Analytical Hierarchy Process. Factors affecting the motivation of breeders towards buffalo breeding had appeared as breeding experience (35%), education (30%), technical knowledge (25%) and age (10%). In addition, the use of family labour (75%) and foreign labour (25%) had appeared as criteria leading the startup or capacity enlargement decisions. The consistency ratio for AHP analysis was Consistency Ratio (CR)<0.10 and this figure confirmed consistency of producer decisions. Main income resources for the enterprises surveyed were animal breeding, other agricultural income, and non-agricultural income.
Keywords: Buffalo, producer decision, analytical hierarchy process, Turkey.

INTRODUCTION

Self-sufficiency is important both for agriculture and the national economy. Self-sufficiency refers to meeting domestic demand for main agricultural and food products with domestic production. When production of main nutritional products is not adequate the country faces rising agricultural and food imports, which affects sustainability of agricultural production. Besides, balanced diet maintenance is essential for social development as well. Balanced nutrition includes vegetative and animal-based product consumption together to meet vitamin and protein needs and animal-based products are essential for protein intake, which is vital for body and brain of individuals (Anonymous, 2016). The global agricultural consumption and trade structure shows us that there is a significant deficit on the level of livestock products. The reflection of the higher per capita income means more demand for livestock products than vegetative crops. As, the absolute saturation level in livestock products is not reached yet, the prices are high, speed of livestock development is slow and the development may take a long time. In this perspective, eliminating supply deficit and reducing foreign dependency in the domestic market is important.

Rising livestock production in the world, accompanied by the rising population and income, leads to peculiarity of livestock products in the global trade. Therefore, supporting policies for livestock breeding have led to a tendency to encourage the sustainability of production (Olhan *et al.* 2010). In livestock production, cattle breeding activity is important in terms of production of meat and milk. Buffalo breeding, besides being recorded as a cattle breeding activity, has specific characteristics. In 2017, the production of cattle and buffalo meat in the world was 70.1 million tons (FAOSTAT, 2019) and there were differences in the products.

Although the water content of buffalo milk is lower than cow milk, buffalo milk has superiorities as well. The ratio of dry matter as protein, fat (about two-fold), casein and lactose is higher in buffalo milk (Naydenova, 1993). These nutritional superiorities lead to recommendation of buffalo milk consumption. In addition, buffalo meat contains higher protein, minerals, vitamins and fewer calories, fat and cholesterol than the cow meat (Soysal, 2006). These figures show that buffalo meat and milk are superior in terms of nutrient contents than cow meat and milk. Besides, buffalo leather is a main raw material for many essential items like shoes and bags for manufacturing industry and famous brands of cheese, milk cream known worldwide. In this sense, the

tendency to demand buffalo products rises in the scope of global trade. The presence of world buffaloes is rising worldwide. Besides, in countries where buffalo breeding has not historical background, as China and India, the development of buffalo breeding is also encouraged due to its commercial importance.

In a similar way, when the last ten years is examined for Turkey, it was understood that 84 thousand heads of buffalo assets in 2007 had increased to 161 thousand heads level in 2017 with the impact of supporting policies (Gurcan *et al.*, 2011; TURKSTAT, 2018). The level of the breeders' tendency to maintain buffalo breeding, their reasons and level of satisfaction are the main subjects focused for development and sustainability of the activity. When the literature is reviewed, it was understood that the research on buffalo breeding concentrates more on technical issues. It can be said that the studies, focusing on business structure, economy and micro-level producer behaviour remains limited. Soysal *et al.* (2005) tried to determine the economic and social conditions of the breeders and the problems they encountered in Danamandıra village of Silivri district of Istanbul. Antonio Borghese (2005) discussed the topics related to buffalo and buffalo products from production to marketing in his book named 'Buffalo Production and Research'.

The demand for organic products (Sahin *et al.* 2013; Atalay *et al.* 2017) and local products are increasing day by day (Kan *et al.*, 2016) and Sahin *et al.* (2013) stated that buffalo production is vital for organic animal product supplies. Cetinkaya *et al.* (2011) have focused on what should be done to improve buffalo breeding in Samsun province. Sarıozkan (2011) examined the status of buffalo breeding in Turkey between 1970 and 2008.

Sweers *et al.* (2014) examined the economic feasibility, breeding and direct marketing opportunities of buffalo breeding in Germany. Othman *et al.* (2014) studied production and reproductive performance at a buffalo farm in Malaysia. Isik and Gul (2016) determined the production cost of buffalo breeders in Muş province of Turkey and found that buffalo breeding was profitable. Akpinar *et al.* (2018) examined the factors affecting relative profitability of buffalo farmers with Tobit model. Gul *et al.* (2018) examined buffalo farm financial indicators. Karli *et al.* (2018) suggested that increasing the scale of the buffalo farm and creating demand for buffalo milk can be achieved by encouraging and supporting young farmers. Akpinar *et al.* (2019) proposed to calculation and monitoring buffalo producer's satisfaction index continuously for sustainability of the activity.

Therefore, it was aimed to determine the criteria that have an impact on sustainability of buffalo breeding and capacity improvement of the current buffalo breeders in Turkey in the frame of a selected sample. In this perspective, the effects of the criteria on the motivation, willingness and behaviours of the breeders were investigated from breeders residing in Afyonkarahisar, Bitlis, Diyarbakır, Istanbul, Mus, Tokat and Samsun provinces of Turkey. The investigated criteria were socio-demographic characteristics of the breeder, the breeder's family. Also, the breeder's income, the supports received for buffalo breeding and the needs of the enterprise were considered as well.

MATERIALS AND METHODS

The material of the study constituted of the data obtained from the survey implemented among 462 buffalo breeders in Afyonkarahisar, Bitlis, Diyarbakır, Istanbul, Mus, Tokat and Samsun provinces of Turkey, where buffalo breeding is intensely maintained. The chosen provinces host 57% of buffalos and supply 56% of buffalo milk production in Turkey. Primary data obtained from buffalo breeders in the selected provinces were analysed by the Analytical Hierarchy Process (AHP).

Analytic Hierarchy Process (AHP) is a decision-making method developed by Thomas L. Saaty (1980) to solve complex problems involving multiple criteria. It allows decision-makers to model complex problems in a hierarchical structure that shows the relationship between the main goal of the problem, criteria, sub-criteria and options (Saaty *et al.*, 2003). The hierarchical organisation of the criteria is widely used in large decision problems (Prakash, 2003; Rommelfanger, 2003).

AHP is a mathematical method that evaluates both qualitative and quantitative variables that take into account the priorities of the group or individuals in decision making (Dagdeviren *et al.*, 2004). It is also a method that can help the decision-making process to be improved and it is easy to understand and implement by business managers (Dagdeviren and Eren, 2001).

The purpose of the selection decision in AHP is to define the chosen subject. Once the subject is defined, the criteria affecting the selection decision can be determined. The problem is divided into hierarchies. Building a hierarchical structure helps the decision-maker to focus on specific parts of the decision (Braunschweig and Becker, 2004). The main objective of the activity takes place at the top of the decision hierarchy. It is followed by the criterion that affects the quality of a decision. The decision options take place at the bottom. AHP consists of four steps; determining the criteria and the related sub-criteria due to the purpose of the decision-maker and creating the hierarchical structure refer to the first step. After creation of the structure, alternatives are compared for each criterion and the respective criteria are compared among themselves. Finally, the relationship matrices are normalised and whether the comparison is consistent within the criteria is examined (Saaty, 1980). Consistency is determined by calculating the consistency rate (CR) developed by Saaty (Saaty, 1999).

In the next step, the numbers required for the comparison matrix are determined. The importance of the criteria

compared with the others is determined with a scale of preference between 1 and 9 points. Values such as 2, 4, 6, 8, which are not significant, are intermediate values (Saaty, 1980). The calculation of the priority of each benchmark is called synthesis. The synthesis process involves normalisation. In the most commonly used normalisation method, the elements of each column are divided by the sum of that column. The averages of the obtained values are kept for structuring the matrix. The normalised matrix is obtained by dividing each column value by the respective column sum. Moving from the normalised matrix; each sequence is averaged. These values obtained are used as the weight percentages of each criterion (Saaty, 1999).

Consistency of the decision-maker is measured towards benchmarks so the Consistency Ratio (CR) should be calculated. AHP proposes a process for measuring consistency for comparison. The resultant Consistency Ratio provides the possibility to test the consistency of the priority vector and the exact comparisons between factors (Saaty, 1980). AHP bases the essence of the CR calculation on the comparison of several factors with a coefficient (λ) called the 'fundamental value'. After calculating the coefficient λ, the Consistency Indicator (CI) is calculated using the formula below (Saaty, 1980).

$$\mathrm{CI} = \frac{\lambda - \mathrm{n}}{\mathrm{n} - 1}$$

In the final step, the CI is divided by the standard correction value called the Random Indicator (RI) to obtain CR. The value corresponding to number of factor is selected from Table 1 (Saaty, 1980).

Table 1. Random display values.

N	RI	N	RI
1	0	8	1.41
2	0	9	1.45
3	0.58	10	1.49
4	0.90	11	1.51
5	1.12	12	1.48
6	1.24	13	1.56

The calculated CR value of less than 0.10 indicates that the comparisons made by the decision-maker are consistent. A CR value greater than 0.10, indicates either existence of a calculation error in AHP or the inconsistency of the decision-maker in comparison (Saaty, 1980).

Some examples of the AHP model used for the analysis of producer decisions in agricultural production should be overviewed. Karakayaci and Karakayaci (2012) determined the criteria that affected the values of agricultural lands in Konya by AHP method and calculated the weight of the criteria. Distance to the settlement and the road, productivity, the shape of the land, rental income etc. were effective for experts to make an objective and correct appraisal. In the study of Cengiz and Celem (2003), benefits that will appear when the AHP method is used as a tool in rural development were evaluated. In order to emphasise that the qualitative and quantitative factors can be evaluated together, a hierarchy has been established for cultural values and how the method can be implemented was expressed. According to this application and other evaluations, it was concluded that the AHP method would be useful in rural development studies. Therefore, it was suggested that the AHP method should be used and spread in future applications. Gunes and Movassagh (2017), who studied the structure of agricultural credit markets in Turkey, had used AHP to determine the factors affecting the choice of farmers in research and alternative lenders. In the study of Ic and Yurdakul (2000), it was aimed to conduct a holistic evaluation model including financial ratios and sectoral status and collaterals examined by classical methods in the credit evaluation process of a firm. Guden and Miran (2008), focused on the decision priorities of the farmers on fundamental management issues such as technical assistance, planning and record-keeping, and the degree of preference of the supporting institutions that on these decisions. The impact was determined by using Fuzzy AHP in order to increase the efficiency of the institutions serving the farmers. In the study of Omurbek, Ustundag and Helvacioglu (2013), areas convenient to livestock breeding were detected by using the AHP method in Isparta province of Turkey for the the location selection of the plant. Cobanoglu and Isın (2009) analysed the criteria and the effect of dried fig producers on an organic farming system with AHP in their study. Price, cost, efficiency, marketing, sustainability-environment criteria were determined as the decision criteria for relevant fig producers.

Although there are many studies using AHP method as demonstrated, there are no studies developed aiming sustainability of livestock activities and proposing a relevant policy. There are supports given especially to increase attractiveness of buffalo breeding, to increase the capacities of breeders and to maintain sustainability of buffalo breeding in Turkey. However, there is no study aimed to increase and maintain buffalo breeding within a producer dimension. This reveals the importance of this study. With this study, the attitudes of the producers towards buffalo breeding and their decision making processes were analysed.

In our study, AHP model fiction, which was used to examine producers' motivation, willingness and preferences in buffalo breeding.

RESULTS

In the study, effects of personal characteristics farmers, their attitudes towards the supports provided and their needs for maintenance of buffalo breeding activity were determined in the perspective of increasing the existing capacity and sustainability of breeders.

According to the research findings 26% of the breeders stated that 'family characteristics' criterion is the most effective one in evaluating on motivation, willingness and behaviours of breeders in terms of continuity of the activity or increasing their productive capacities. The other relevant criteria were 'personal characteristics of the farmer' with 22%, 'attitude of the farmers towards supports' with 20% 'enterprise's needs' with 17% consecutively. Finally, 15% of the breeders stated that 'enterprise's characteristics' is the most effective criterion on motivation, willingness and behaviour of breeders (Table 2).

As the calculated consistency ratio observed in Table 2 was CR <0.10 (CR = 0.02), it was determined that decision-makers were consistent in comparisons regarding motivation, willingness and their behaviours.

The effect of personal characteristics on buffalo breeding: The farmer's ability to predict the future and being open-minded and hard-working are important factors for the success of both the farmer and the enterprise. In this respect, personal characteristics are directly related to the success of the farmer and the enterprise. These characteristic also directly affect the sustainability and development of existing production activity of a successful enterprise. Accordingly, it was aimed to determine the criteria that affect farmers' motivation, willingness and attitudes in continuity of buffalo breeding activity or improving their existing capacities such as age, education level, technical knowledge and breeding experience. According to the percentage weights calculated from the normalized values, 35% of the producers stated that 'breeding experience' was the most important criterion. The following criteria are 'education level' with 30%, 'technical knowledge' with 25% and 'age' with 10% for sustainability the buffalo breeding activity (Table 3).

***The effect of family characteristics on buffalo breeding*:** The family business structure is essential for agricultural activities in Turkey. The decisions taken by the family and family applications are directly effective on the success and the sustainability of the business. The transition from a family business to the commercially operating agricultural enterprise would lead to rising demand for foreign labour. If businesses continue to operate as a family business on a small scale, they only benefit from the family labour. On the contrary, commercial enterprises can benefit from foreign labour. The adoption of commercial production by enterprises makes a positive contribution to the farmers in terms of maintaining their existing activities.

It was aimed to determine whether breeders value family labour or foreign labour utillisation more for breeding activities in the scope of their motivation, willingness and behaviours 75% of the producers stated that 'family labour' is the most useful criterion for sustainability buffalo breeding activity, while 25% value 'foreign labour' more. The calculated consistency ratio was CR <0.10, (CR = 0.02). It was understood that family labour preference is a consistent decision criterion for the breeders (Table 4).

Table 2. Normalisation and percentage weights of criteria in buffalo breeding.

tcivCriteria	Personal char-acteristics of the farmer	Family charac-teristics	Characteris tics of the farmer	Attitude towards supports	Enterprise's needs	w_i (% weight of criteria)	d_i	e_i
Personal characteristics of the farmer	0.22	0.25	0.29	0.20	0.17	0.22	1.15	5.11
Family characteristics	0.22	0.25	0.29	0.20	0.33	0.26	1.32	5.11
Characteristics of the farmer	0.11	0.13	0.14	0.20	0.17	0.15	0.76	5.09
Attitude towards supports	0.22	0.25	0.14	0.20	0.17	0.20	1.00	5.09
Enterprise's needs	0.22	0.13	0.14	0.20	0.17	0.17	0.87	5.08
Total	1.00	1.00	1.00	1.00	1.00	1.00		

n=5 λ=5.10 RI=1.12 CI=0.02 CR=0.02

Table 3. Normalisation and percentage weights of personal characteristics in buffalo breeding.

Criteria	Age	Education level	Technical knowledge	Breeding experience	w_i (% weight of criteria)	d_i	e_i
Age	0.10	0.10	0.08	0.12	0.10	0.40	4.05
Education level	0.30	0.30	0.23	0.35	0.30	1.20	4.05
Technical knowledge	0.30	0.30	0.23	0.18	0.25	1.02	4.05
Breeding experience	0.30	0.30	0.46	0.35	0.35	1.45	4.10
Total	1.00	1.00	1.00	1.00	1.00		

n=4 λ=4.06 RI=0.90 CI=0.02 CR=0.02

Table 4. Normalisation and percentage weight of family characteristics in buffalo breeding.

Criteria	Family labour	Foreign labour	w_i (% weight of criteria)	di	ei
Family labor	0.75	0.75	0.75	1.5	2
Foreign labor	0.25	0.25	0.25	0.5	2
Total	1.00	1.00	1.00		

n=2 λ=4.06 RI=0 CI=0.02 CR=0.02

Table 5. Normalisation and percentage weights of farm income in buffalo breeding.

Criteria	Other agricultural income	Non-agricultural income	Livestock income	w_i(% weight of criteria)	d_i	e_i
Other agricultural income	0.14	0.14	0.14	0.14	0.43	3.00
Non-agricultural income	0.29	0.29	0.29	0.29	0.86	3.00
Livestock income	0.57	0.57	0.57	0.57	1.71	3.00
Total	1.00	1.00	1.00	1.00		

n=3 λ=3.00 RI=0.58 CI=0.00 CR=0.00

Table 6. Normalisation and percentage weights of support in buffalo breeding.

Criteria	Production support	Marketing support	Infrastructure	wi(% weight of criteria)	d_i	e_i
Production support	0.50	0.57	0.40	0.49	1.51	3.08
Marketing support	0.25	0.29	0.40	0.31	0.95	3.05
Infrastructure	0.25	0.14	0.20	0.20	0.60	3.03
Total	1.00	1.00	1.00	1.00		

n=3 λ=3.05 RI=0.58 CI=0.03 CR=0.05

The effect of income on buffalo breeding: Sustainability of agricultural enterprises and consequently rise in production is directly related to income. Higher income expectancy is effective in the continuity and growth of the enterprise. The growth in the enterprise starts with the current production type and then continues to transition to other production varieties, and after a while, it leads to sectoral changes.

Significance levels of binary comparisons of criteria on motivation, willingness and attitude have been normalised by the AHP in terms of continuation of buffalo breeding activity or increasing the existing capacities of buffalo breeders in Turkey. The comparison was made among the agricultural income, non-agricultural income and livestock income alternatives. According to the percentage weights calculated from the normalised values, 57% of the producers stated that 'livestock income' is more important. It was followed by 'non-agricultural income' with 29% and 14% of the enterprises stated that 'other agricultural income', referring to vegetative production is the most effective criterion for starting buffalo breeding activity. The consistency ratio was CR<0.10 (CR=0.00), and the decision-makers' made their comparisons consistently (Table 5).

The effect of supports on buffalo breeding: Sectoral support refers to all measures taken to protect the sector, encourage its activities and promote its sustainability. The agriculture sector is essential due to the food demand of the society. The agricultural sector needs to be supported due to its importance in human nutrition and the continuity of production accordingly. This time effects of production, marketing and infrastructure supports on motivation, willingness and attitudes of buffalo breeders were normalised by the AHP in terms of continuation to buffalo breeding activity or increasing the existing capacities.

According to the percentage weights calculated from the normalised values, 49% of the breeders stated that 'production supports' was the most important criterion. It was followed by 'marketing supports' with 31% and 20% of the enterprises stated that 'infrastructure facility supports' are effective in maintenance of buffalo breeding. The consistency ratio was CR<0.10(CR = 0.05) referring to consistence of the farmers in decision-making (Table 6).

The effect of sustainability on buffalo breeding: The high nutritional value of milk and cream products obtained from buffalo breeding compared to other animal products demonstrates necessity of buffalo breeding. Specifically, as consumption of animal products is limited, buffalo production in Turkey must be encouraged to eliminate the these limitations, and continuity of existing enterprises must be promoted. Factors such as support, marketing, production and sustainability of the market are important in increasing the population of buffalo breeding.

Afterwords, criteria effective on the continuity of buffalo breeding activity or increasing the existing capacities of buffalo breeders in Turkey were compared. Accordingly, sustainability of enterprises, supports, marketing, production sustainability and market sustainability alternatives were normalised with the AHP. According to the percentage weights calculated from the normalization values, 30% of the

producers stated that 'supports is important'. It was followed by 'sustainability of production is important' with 25% and 'market sustainability is important' with 25%. In addition to market sustainability, 21% of the enterprises stated that 'marketing activities are important' criterion is the most effective criterion for sustainability of buffalo breeding. With CR<0.10 (CR = 0.02), it was understood that criterion comparisons were consistent (Table 7).

The effect of the magnitude of support on buffalo breeding: Agricultural supporting policies are generally used to develop an activity or to reactivate the reduced production activity. Turkey is bound to benefit from the support policies to support the revitalisation of the buffalo breeding, and it is essential for improving the buffalo breeding at each stage of production and marketing processes.

In the study, the breeders' considerations among the support criteria applied by the Ministry of Agriculture and Forestry were assessed respecting marketing, input supply, credit and technical supports. The significance levels of binary comparisons of the criteria were normalised with AHP in terms of the importance of different support services. According to the percentage weights calculated from the normalised values, 39% of the enterprises stated that 'marketing support services' are essential for sustainability of activities at the first rank. It was followed by 'input supply support services' with 28%, 'credit support services' with 16% and 'technical support services' criterion with 16%. With CR<0.10 (CR = 0.02), it was determined that the decision-making units made the criterion comparisons consistently (Table 8).

***The effect of marketing on buffalo breeding*:** The marketing of agricultural products is as important as production for sustainability. It is known that the products obtained from buffalo breeding are different from the products obtained from other animals. In the marketing chain of products obtained from buffalo breeding, there usually exists either cooperative/union or broker/intermediary or private firms. In line with the characteristics of the region and enterprises, it was aimed to determine which alternatives provides the farm with the best marketing opportunities.

Taking into account the marketing channel where the buffalo breeders in Turkey sell their products AHP methodology was implemented. According to the percentage weights calculated from the normalisation values, 55% of the enterprises stated that 'cooperative/union' structures' provide the highest benefit to breeders in terms of market reach. The other

Table 7. Normalisation and percentage weights of sustainability in buffalo breeding.

Criteria	Support is important	Marketing activities are important	Sustainability of production is important	Sustainability of marketing is important	w_i(% weight of criteria)	d_i	e_i
Support is important	0.29	0.40	0.25	0.25	0.30	1.21	4.08
Marketing activities are important	0.14	0.20	0.25	0.25	0.21	0.85	4.04
Sustainability of production is important	0.29	0.20	0.25	0.25	0.25	1.00	4.06
Sustainability of marketing is important	0.29	0.20	0.25	0.25	0.25	1.00	4.06
Total	1.00	1.00	1.00	1.00	1.00		

n=4 λ=4.06 RI=0.90 CI=0.02 CR=0.02

Table 8. Normalisation and percentage weights of the magnitude of support in buffalo breeding.

Criteria	Marketing support services	Input supply support services	Credit support services	Technical support services	w_i(% weight of criteria)	d_i	e_i
Marketing support services	0.40	0.50	0.33	0.33	0.39	1.61	4.11
Input supply support services	0.20	0.25	0.33	0.33	0.28	1.13	4.06
Credit support services	0.20	0.13	0.17	0.17	0.16	0.66	4.04
Technical support services	0.20	0.13	0.17	0.17	0.16	0.66	4.04
Total	1.00	1.00	1.00	1.00	1.00		

n=4 λ=4.06 RI=0.90 CI=0.02 CR=0.02

Table 9. Normalisation and percentage weights of marketing criterion in buffalo breeding.

Criteria	Cooperative/union	Broker / intermediary	Private firms	w_i(% weight of criteria)	d_i	e_i
Cooperative/union	0.55	0.50	0.60	0.55	1.66	3.03
Broker / intermediary	0.27	0.25	0.20	0.24	0.73	3.01
Private firms	0.18	0.25	0.20	0.21	0.63	3.01
Total	1.00	1.00	1.00	1.00		

n=3 λ=3.02 RI=0.58 CI=0.01 CR=0.02

Table 10. Normalisation and percentage weights of willingness criterion in buffalo breeding.

Criteria	The willingness of the farmer	Income	w_i(% weight of criteria)	d_i	e_i
Willingness of the farmer	0.33	0.33	0.33	0.67	2.00
Income	0.67	0.67	0.67	1.33	2.00
Total	1.00	1.00	1.00		

n=2 λ=2.00 RI=0 CI=0.00 CR=0.00

Table 11. Normalisation and percentage weights of profitability criterion in buffalo breeding.

Criteria	High profit	Low risk	w_i(% weight of criteria)	d_i	e_i
High profit	0.50	0.50	0.50	1.00	2.00
Low risk	0.50	0.50	0.50	1.00	2.00
Total	1.00	1.00	1.00		

n=2 λ=2.00 RI=0 CI=0.00 CR=0.00

preferred channels were 'broker/intermediary' with 24% and 21% of the enterprises stated that 'private firm' criterion would provide the highest profit to their enterprises. With CR<0.10 (CR = 0.02), it was determined that criterion comparisons were consistent (Table 9).

The effect of willingness on buffalo breeding: In general, the willingness is a demand or desire situation to perform an activity, and expectation of an activity to provide a return increases the willingness of the decision maker. The desire for maintenance of the activity within the economic structure is directly related to the financial gain expected from this activity. Since agriculture is one of the critical sectors of the economy, the continuity of agricultural production and willingness is also related to the income expectations. The earnings from buffalo breeding are directly dependent on the farmer's willingness to produce. So, there is a cyclical dependency.

Binary comparisons were made among the following alternative criteria. Farmer's willingness and income, which are effective on motivation, and willingness and attitude towards activity, have been normalised respecting maintenance of the acitivity. According to the percentage weights calculated from the normalisation values, 67% of the producers stated that 'income' is the most important criterion considered for sustainability and 'the willingness of the farmer' followed this significant criterion with 33%. is an effective criterion for maintaining buffalo breeding activity. The consistency ratio was CR<0.10(CR = 0.00) and it was understood that the decision-makers stated that they made the benchmarks consistent (Table 10).

The effect of profitability criterion on buffalo breeding: The profit the difference between the sales revenue and production costs and all enterprises aim to maximise their benefits within the framework of their economic structure. Farmers want to make a high profit within the business thought. Also, farmers attempt to ensure the continuity of their businesses by keeping the risk rate as low as possible due to the fact that risk factors are considered to on the sustainability of the business negatively.

According to the characteristics of the buffalo breeding; the interviewees were asked to choose between high profit and low-risk alternatives. According to the percentage weights calculated from the normalised values; 50% of the enterprises preferred 'low risk' and 50% preferred the 'high profit' criterion. Therefore, the farmers appeared to be indifferent between risk minimization and profit maximization. Since the calculated consistency ratio was CR<0.10 (CR = 0.00), it was determined that this indifference finding was consistent (Table 11).

DISCUSSION

Self-sufficiency in agricultural production and supplies is accepted as a strategy everywhere in the world. This self-sufficiency consideration is valid both for vegetative and animal production the actor is the producer who makes all kinds of decisions regarding the production activities. The analysis of producer behaviour and decision making process

separately are essential both in general and specific terms. Within this study, the characteristics affecting buffalo breeders' decision making process in maintanence and sustainability of the activity were analyzed based on binary criterion comparisons under separate titles relevant to producer, producer family characteristics and features of the business.

Based on the findings of this study, the personal characteristics of the farmer and the family structure had appeared as useful variables in continuity of buffalo breeding and the tendency to increase the production capacity. In addition to this, the needs of the enterprise and the attitude of the producer towards the supports provided as well as support services open to enterprises were seen as significant variables in motivation and willingness level of the producer. At the micro-level, producer's breeding experience, educational level, technical knowledge and age had appeared as the critical criteria for starting and maintaining buffalo breeding activity. The determination of supporting fields compatible with the variables expressed here should be proposed in this perspective.

As labour is the primary input of production activity, amount, cost and availability of labour, should be in the agenda. In livestock production, the supply of labour is considered as an essential problem. In this context, the effect of family and foreign labour force on the process and the family labour force potential appeared as a priority concerning the tendency towards buffalo breeding. Also, foreign labour criterion was considered to have an effect, despite being lower. In terms of income from the producers' point of view, other agricultural (vegetative) and non-agricultural income sources may have an impact on the sustainability of the production activity and the producer behavior as well as animal breeding activity. Therefore, one of the striking results obtained in our study was income from other agricultural activities, and non-agricultural activities appeared as important variables. Yet, start and sustainability of the activity is mainly affected by animal breeding activity income.

Supporting policies were evaluated with a public supports dimension, when production, marketing and infrastructure supports are evaluated with a holistic definition. It can be said that producer preferences were concentrated more on production and marketing supports. This situation can be related to the production and marketing of crops and livestock products in developing countries is dependent on the sustainability of the market, marketing and producer's perspective on marketing subject.

While improvements in production and infrastructure are likely to be seen in a shorter period, the change in producer perception, knowledge, attitudes and behaviors on the producer cooperatives or union requires a more extended period of time. As a matter of fact, one of the most significant differences among developed and developing countries in livestock production is cooperation on producer level. In the same definition, cooperation of producers under cooperative/union structures appeared as an important tool for maximising the profitability of farmers due to the micro-findings of the study. This situation is critical in terms of revealing the breeders' knowledge and sensitivity in cooperating activities in buffalo breeding.

***Conclusion*:** Accordingly, it was considered as beneficial to focus on solution of the marketing problem at producer level in terms of supporting policies. It can be stated that the efforts to improve the quantity and quality of production cannot be achived under the condition that the marketing problems were not solved. In solution of the marketing problem, establishment and development of producer cooperation's and/or unions emerged as a priority issue related to producer profit maximization. The finding is consistent with the general expectations. As it is the case for all livestock breeding activities, the development of producer organisation in buffalo breeding can be considered as an important policy development field.

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