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THE EXAMINATION OF DIFFERENCES IN TERMS OF SOCIO-ECONOMIC, STOCK PERIOD AND INFORMATION NEEDS OF THE ENTERPRISES ENGAGED IN STOCK-FARMING ACTIVITY

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Abstract

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In this study, it is aimed to present the relations between the socio-economic characteristics and the main information needs of the owners of the stock enterprises in Aegean region-Turkey. The data obtained from the survey is evaluated with the Non-Linear Canonical Correlation Analysis. It is determined that the variables discussed are the factors that cause the main differences between the enterprises engaged in the stock-farming activity. Accordingly, it is determined that the age of the producers having young stock-animal is 31-45 and these are the low- and middle-income producers; the producers use their own experience as the main information need about the stock-farming and they consult the veterinary surgeons and zoo technicians about the feed ratio. Furthermore, the majority of these enterprises state that they consult the veterinary surgeons in case of need. When evaluated in general, it can easily be said that the producers using information needs make more profitable production from the young animals in the stock-farming activities.

Key words: stock enterprises, information needs, non-linear canonical correlation analysis (OVERALS)

Abbreviations: (OVERALS) Non-Linear Canonical Correlation Analysis, (CCA) Classical Linear Canonical Correlation Analysis, (ALS) Alternating Least Squares, (CBAA) Cattle Breeders' Association of Aydin-Turkey

Introduction

The animal production is an important production branch for meeting the protein needs of people in terms of outputs. Among the animal products, meat and meat products are significant in terms of meeting the need, creating employment opportunities, contribution to economic growth and development.

When the meat amount of Turkey in 2011 is examined, the 67.49% of the production is met by the poultry. The beef, 4.48% by the mutton and 1.05% meet 29.98% of the remaining meat amount by the partial goat, cow and other livestock raising. 15.3% of the animals in our country are composed by the bovine animals in Aegean region-Turkey (TSI, 2012). According to 2012 data in Aegean region-Turkey, 49234 enterprises engage in animal activities with 1889647 bovine animals (CBAA, 2012).

The cattle fattening is sub-sector of the stock-farming that undertakes great duties in transforming the calf and breeding cow, an important output of the dairy farming, into highly productive and qualified meat by evaluating economically. In addition to the financial functions, cattle fattening has also duties in healthy and balanced nourishment of people (Sakarya, 1993). The main objective in the cattle fattening enterprises is to gain profit as in all the enterprises. The factors such as the increase in weight of the live animals, feed consumption and skills of utilizing the feed, and the relations among these directly affect the profitability (Sakarya, 1993; Sakarya and Gunlu, 1996; Aydin and Sakarya, 2011). Moreover, the training of the producer engaged in the stock activity is significant in terms of the development and profitability of the stock farming. It is also known that the training level of the producers engaged in the agricultural activities is low (Cetin, 2003).

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The factors such as age, stock period, the supply resources of the stock animals and the information needs used for the stock-farming activities in the stock enterprises represent the behaviors of the enterprise owner. As these factors show changes according to the enterprises, it is necessary to examine the elements affecting the processes of decision and behavior.

There are a great number of studies, especially about the processes of decision and behavior, in the literature reviewed. In general, the factors that affect the process of decision by utilizing the multi-variable analysis methods are examined in the studies. Solano et al. (2000), examined the relations between the characteristics of the farm and producer with the use of technology in dairy enterprises; and detected a positive relation between the utilization level of technical consultants and the level of education. In their studies, Bellini and Ramberti (2009) examined the relations between the socio-economic levels of the produces engaged in the organic agriculture and the agricultural environment; and found that the economic concerns of the producers affect their behavior. Furthermore, there are a great number of studies on the behaviors and attitudes of the farmers (Cetin, 2003; Terim and Ates, 2010; Koksal et al., 2010; Ikdogan, 2012).

When the literature is reviewed in regard to the Non-Linear Canonical Correlation Analysis (OVERALS), it is observed that the studies are limited, and that it is effectively used in many fields such as the analysis of the customer behavior(Bayram and Ertas, 2001; Hsieh, 2001), the determination of the factors affecting the climate change(Cannon and Hsies, 2008; Sertkaya and Kadilar, 2002), the determination of the factors affecting the human behavior and attitude (Filiz and Kolukisaoglu, 2012), the classification of the factors affecting the traffic accidents (Golob and Recker, 2011), the examination of the problems that the university students encounter (Saracli and Saracli, 2006; Girginer et al., 2007), in the field of medicine and biomedicine (Theodosiou et al., 2012; Yazici et al., 2010), and in the classification of the profitability in the banking sector (Sertbarut, 2010).

In this study, it is aimed to analyze the relation between the socio-economic characteristics and main information needs of the stock enterprise owners engaged in the bovine breeding in Aegean region-Turkey. The OVERALS and multi-variable analysis methods are used to discuss the process of behavior and decision of the enterprises.

Material and Methods

The main material of this research is the data gathered from the enterprises of bovine breeding in Aegean region-Turkey region. The number of the enterprise owners is determined with the rational sample volume formula (Newbold, 1995).

$$n = \frac{Np(1-p)}{(N-1)Q^2_{px} + p(1-p)} \quad (1)$$

In the formula, n refers to sample volume, N to total number of the bovine breeding enterprises, P to the rate of the producers to be sampled, $Q_{px}$to the variance of the rate.

As there is no clear difference between the stock-farming and dairy farming in the enterprises, the volume sample is determined by considering all the 49234 enterprises in Aegean region-Turkey to be engaged in the stock farming within the scope of research. In the sample volume calculated, 90% confidence interval and 10% margin of error are based on. According to these calculations, the data is gathered from the survey made with 67 producers in December - 2012.

Classical Linear Canonical Correlation Analysis (CCA) is the basis of OVERALS to be used for the examination of the processes of behavior and decision of stock-farming enterprises. The CCA developed by Hotellingin 1936 is one of the multi-variable statistics analysis techniques that determine the degree (correlation) of the relation between the cluster composed of independent variables and the cluster composed of the dependent variables (Tekin, 1993). There are some assumptions required to realize the CCA. The assumptions are; multi-variable normal distribution of the variables, enough data, no traverse values, no unnecessary variable irrelevant to the problem in the data matrix and lack of full correlation between the variables (Golob, 1985; Ozdamar, 2004; Filiz and Kolukisaoglu, 2012). If one or more of the aforementioned assumptions cannot be provided, the OVERALS can be used (Sut, 2001). By examining two or more variable cluster, the OVERALS examines the resemblance of the clusters (Gifi, 1989; Bayram and Ertas, 2001).

The OVERALS does not make any assumptions about the linearity of the relations or the distribution of the variables that might have different measurement levels. The OVERALS is designed for the variable clusters and the problems of the categorical variables.

To be brief, the data measured with the different scale types such as nominal, ordinal and quantitative (interval and rational scale) can be included in the analysis progress and including the graphical presentation of the variables on a two-dimensional level presents the attraction of the analysis(Golob and Recker, 2003; Giray, 2011; Girginer et al., 2007). The component load graphics are used to interpret the variable clusters used in the analysis. Centroids graphic is used to understand the structure of relation between the

categories of variables discussed. The help of these graphics can visually see the degree of these variables.

Similar to other multi-variable analysis techniques, the OVERALS is completed with a loss function and limits. In the OVERALS, the loss function formulated about maximization of the homogeneity by weighting is as follows (Giray, 2011; Filiz and Kolukisaoglu, 2012):

$$\sigma_m(X,A) = K^{-1}\sum_k SSQ(X - H_k A_k) \qquad (2)$$

Here, the object scores having X (n*p) size refer to the total of square of diagonal components of the SSQ matrix, the number of K cluster and total number of m variable. While giving the matrix showing H_k(n x jk) size k. variable cluster (jk: the number of variable in the cluster), it refers to the matrix showing the A_k (jk x p) size weight vectors. As the indicator matrix is used instead of the original data matrix in the qualitative data analysis in the OVERALS analysis, $G_j$indicator analysis should be used instead of the H_k matrix and Y_j category digitization matrix instead of $A_k$weight. In this case, a loss function is formulated (Michailidis and de Leeuw, 1996):

$$\sigma_m(X,Y) = K^{-1}\sum_k SSQ\left(X - \sum_{J\in J_k} G_{kj}\, Y_k\right) \qquad (3)$$

Here, the category quantification having Y_j, (k_j x p) size refers to the indicator matrix of j variable having G_j, (n x k_j) size. Moreover, J cluster index of the ($J \in J_k$) variables is separated into k sub-clusters J(1)….J(k)…..J(K) (Burg and de Leeuw, 1988; Michailidis and de Leeuw, 1996; Meulman and Heiser, 2005). The relevant function is minimized with the Alternating Least Squares (ALS) algorithm and the optimal solution values are obtained[31]. In this way, it is understood that all the variables stated in the function are multi-classifying and have multi-solution results (Bayram and Ertas, 2001).

The degree of the relation between the dimensions after the analysis is interpreted with the canonical correlation coefficient. This value is between 0 and 1, and stated as percentage. The canonical correlation coefficient cannot be seen after the analysis; however, it can be obtained with the following formula (Meulman and Heiser, 2005): The Canonical Correlation = [(Set Number * Secular Value) – 1) / (Set number – 1)] there are not any test values in the application results of the OVERALS except for the canonical correlation coefficient.

3 different variable clusters or in other words 3 different sets are formed under the titles of socio-economic characteristics, stock period and the information needs utilized in the stock-farming activity in the study. There are 13 variables under these 3 different clusters (Table 1). The results are interpreted by presenting differences between behaviors and attitudes of the producers with the data gathered from the enterprises engaged in the stock activity with the OVERALS method.

Results and Discussion

Because of the survey study, the majority of the producers engaged in the stock-farming activity are between the ages of 31-60, which is the middle-age group. 40.6.5 of the producers are in the 46-60 age group, 36.2% are in the 31-45 age group, 15.9% are at the age of 60 or more, and only 7.3% are at the age of 300 or less. When the education level is examined, it is determined that 44.9% of the producers are primary school graduate, 23.2% are high school graduate and 20.3% are secondary school graduate and 11.6% are high-school graduate. 56.5% of the producers have low-income. Furthermore, 39.7% of the farmers stated that they engaged in a training or publication study concerning the stock farming.

13 variables taken into OVERALS analysis have convergence with 47 iterations. The most suitable result is obtained with a difference value under the breakpoint stated in the last 2 iterations. This means that the digitization and object score values are determined with 47 iterations, the loss function is minimized and the most suitable solution is reached.

When Table 2 is examined about the OVERALS sets discussed, the average loss value is found as 0.184 for Dimension 1, and as 0.274 for the Dimension 2. The fact that the loss values are close to zero shows that the interpretive power of the solution is high. The amount of relation displayed in the dimension is obtained by subtracting the average loss from 1. The amount of relation displayed in Dimension 1 is found to be 0.816 and the amount of relation displayed in Dimension 2 is found to be 0.726. The total compliance value is calculated to be 1.542 for the analysis. As the highest possible value of the compliance for this analysis is 2 (77%), it can be said that the obtained value is rather good in terms of acceptable measurements.

The Canonical Correlation Coefficients calculated for the OVERALS is 0.724 for the Dimension 1 and 0.589 for the Dimension 2. These values show that the sets have a positive relation in terms of the variables discussed successfully in the Dimension 1 and medium-rate in Dimension 2 (50%).

When the weight values of the variables are examined (Table 3), the highest contributions to the Dimension 1 are calculated as the age of the livestock (0.709), participation in a training and publication study about the stock-farming (0.629) and stock period of the animals (0.605). The high-

Table 1
The variable list and optimal scaling levels

	Optimal Scaling Name and Level	Category	
1	Education (Ordinal)	(Psc): Primary school (Hsc):High School	(Ssc): Secondary School (YvU): University
	Age (Ordinal)	(Y1): 30 years and under (Y3):46-59	(Y2):31-45 (Y4):60-+
	Income* (Ordinal)	(G1):Low (G3): Gut	(G2): Middle (G4):High
	Livestock Activity (Ordinal)	(B1): under 10 Years (B3):21-+ Years	(B2): 11-20 Years
	Sale Price* (Ordinal)	(P):15 Turkish Lira (TL) (P+):15 more than TL.	(P-):15 less than TL.
2	How many years alt is fattening animals? (Ordinal)	(A1):0-3 Month (A3): 7-12 Month (A5):+15 ay	(A2):4-6 Month (A4):13-15 Month
	How many kg weight is fattening animals? (Ordinal)	(K1):50-150 Kg (K3):251-350 Kg (K5):451-550 Kg	(K2):151-250 Kg (K4):351-450 Kg
	How long do you have keep your cattle fattening? (Ordinal)	(N1):0-4 Month (N3): 7 Months or more	(N2):5-7 Month
	How many kg weight do you have keep your cattle fattening? (Ordinal)	(T1):200-400 Kg (T3): 501-600 Kg (T5): 701-800 Kg	(T2):401-500 kg (T4): 601-700 kg
3	Needs Information to feed ration (Multi Nominal)	(R1):Yourself (R3): Ministry of Agri. (R5):Zooteknist	(R2): Vet. physician (R4): Neighbors, relatives (R6): Feed company
	Needs Information on animal health (Multi Nominal)	(S1): Need for consulting (S3): Negotiated Union Vet. physician	(S2):Private Vet. physician (S4):Cooperation Vet. physician
	What is yours basics Information in Livestock activities (Multi Nominal)	(TB1):Yourself (TB3): Ministry of Agri. (TB5):Zooteknist	(TB2): Vet. physician (TB4): Newspaper, Radio, TV (TB6): Feed company
	Have received training to fattened (Singular nominal)	No	Yes

* It is determined according to the statements of producers.

Table 2
The compliance values related to the analysis

		Dimension		Total
		1	2	
Loss Function	Set 1	0.157	0.212	0.369
	Set 2	0.207	0.381	0.588
	Set 3	0.189	0.230	0.419
	Mean	0.184	0.274	0.458
Eigenvalue		0.816	0.726	
Fit				1.542

Table 3
The weight load of variables

Variables				Dimension	
				1	2
1	a. Education (Ordinal)			-0.004	0.246
	b. Age (Ordinal)			0.076	0.373
	c. Income* (Ordinal)			-0.112	0.281
	d. Livestock Activity (Ordinal)			0.238	0.244
	e. Sale Price* (Ordinal)			-0.340	0.166
2	f. How many years alt is fattening animals? (Ordinal)			**0.709**	0.514
	g. How many kg weight is fattening animals? (Ordinal)			0.120	**0.539**
	h. How long do you have keep your cattle fattening? (Ordinal)			**0.605**	0.277
	i. How many kg weight do you have keep your cattle fattening? (Ordinal)			-0.579	**0.576**
3	j. Needs Information to feed ration (Multi Nominal)	Dimension	1	0.246	-0.390
			2	-0.253	0.482
	k. Needs Information on animal health (Multi Nominal)	Dimension	1	0.273	0.193
			2	0.271	0.215
	l. What is yours basics Information in Livestock activities (Multi Nominal)	Dimension	1	0.535	0.459
			2	0.335	**0.759**
	m. Have received training to fattened ? (Singular nominal)			**0.629**	-0.376

est contributions to the Dimension 2 are calculated as main information needs utilized (0.759), the weight of the animals during stock (0.579) and the weight of the animals before the stock (0.539). It can be said that the factors causing the main difference between the enterprises engaged in the stock-farming are the aforementioned variables.

It is expected that the variables in the component weight graphic (Figure 1) are as far from the origin as possible. The higher the distance degree is, the higher the importance of these variables. Therefore, the stock-farming training, stock period, main information needs about the stock farming and the age of animal are important variables. Furthermore, it can be said that there is a strong reverse relation between the stock-farming training and information needs about the animal health against the weight of the stock animal.

When the Centroids graphic is examined (Figure 2), it is observed that the producers that received about the stock farming maintain the weight of animal between 701 and 800 and sell them over the market price.

The young producers take the animals that are 7 to 12 months old and 151-250 and 251-350 kg into stock. Moreover, the education level of these producers is college and university and they consult the authorized personnel of the feed company about the feed ration.

The producers that have less than 10 years of experience state that they take the animals between 351-450 kg and 451-500 kg into stock, they have received no training about the stock farming and they sell the animals at/below the market prices.

The age of producers that take young animals into stock is between 31 and 45, they have low- and middle-income, they utilize their own experience as the main information needs about stock-farming and consult veterinary surgeons and zootechnicians about the feed ration. Furthermore, these enterprises stated that they consult the veterinary surgeons if required.

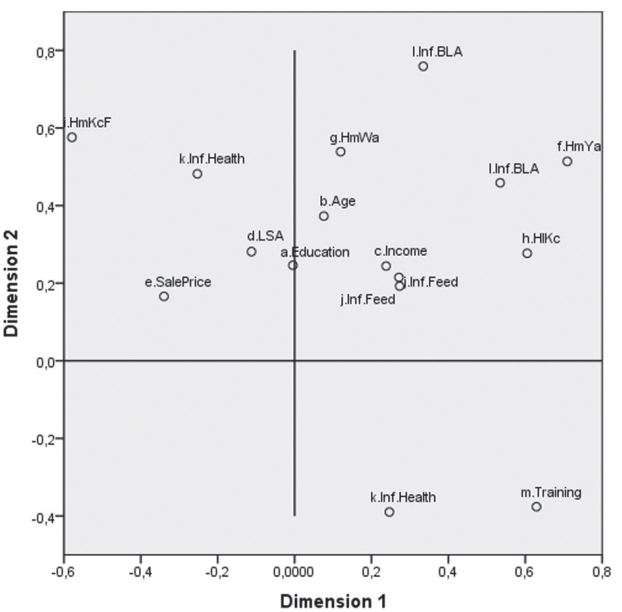

Fig. 1. The graphical presentation of component loads

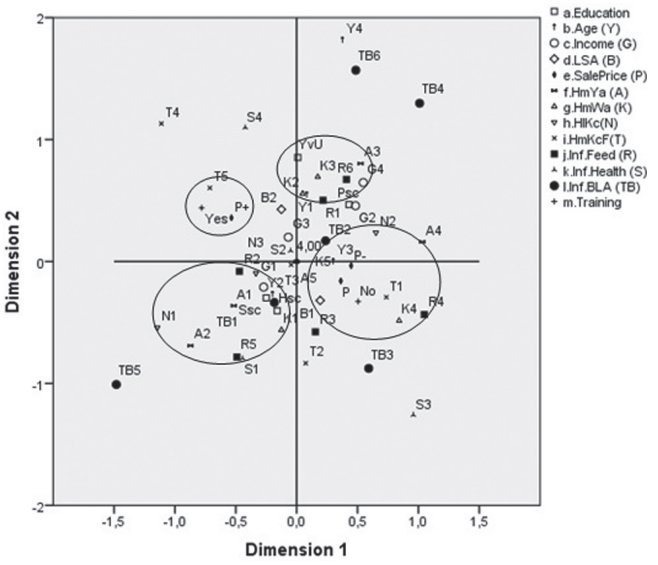

Fig. 2. The Centroids Graphic

The aforementioned groups are homogenous among each other, and it can be said that the stock enterprises in Aegean region-Turkey can be categorized under these 4 main groups.

Conclusion

The total variance value stated because of the OVERALS is found to be 1.542. As the highest possible value of a two-dimension assessment can be 2, it is concluded that the compliance value is good.

Based on the classical information, it can be said that the stock-farming activity can be carried out successfully with the animal material of all ages. However, taking the young animals into stock can be more advantageous compared to taking the old animals into stock (Ensminger, 1980; Lawrence and Fowler, 1996). The most important point here is that the high performance in feed utilization and skill of containing food substance of the young animals are better compared to old animals. As the main objective of the stock-farming activity is to gain profit, two main subjects will affect the profitability. First one is the acquisition or purchase of stock material at reasonable prices, and the other one is implementation of suitable stock program according to the age and physiological condition of the stock material (Ensminger, 1980; Alpan, 1990; Kilic, 1996). In this study, it is observed that the young producers take younger animals into stock, carry out a longer stock period, and sell their animals at better prices compared to the other groups. It is observed that the producers having less than 10 years of experience in stock-farming activity incline towards animals that are older and have completed the majority of the physiological development. As a consequence, it can be said that the producers that are more educated and utilize the information needs make a more profitable production with young animals in the stock-farming activity.

The help of this study interprets the main differences among the stock enterprises interpreted with the results of OVERALS application. It is more accurate to state that no other test values are obtained except for the canonical correlation coefficient based on the graphical expression, and that this analysis is preliminary-assessment method. Therefore, it will more productive to interpret the results obtained by utilizing other methods.

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