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Analysis of Components of Organic Dairy Farming in the Province of Ardabil, Iran

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***Abstract* – Organic farming has gained importance worldwide, in view of increased environmental awareness, consumer preferences as well as sustainability of farm resources. The purpose of this study was to identify dairy farmers' personal and professional characteristics and analyze the components of organic dairy farming. The dairy farmers of Ardabil province in Iran constitute the statistical population of this research (N=119387). A number of 240 Dairy farmers were selected as a sample by using randomized sampling method and Cochran's formula. Sampling was stratified random sampling method. Reliability of the questionnaire was Determined by Using Cronbach's Alpha Test (α=0.93). SPSS 19 and Lisrel 8.8 as Well as Confirmatory factor analysis and descriptive statistics items for analyze data. Confirmatory factor analysisof components of organic dairy farming indicated that various dimensions include: 1. Health, Safety and Veterinary 2.General management of livestock 3. Milking Management 4. Animal Feed 5. Animal welfare 6.Facilities and waste management, were important factors of organic dairy farming.**

***Keywords* – Organic, Dairy Farming, Ardabil.**

I. INTRODUCTION

Organic farming has gained importance worldwide, in view of increased environmental awareness, consumer preferences as well as sustainability of farm resources. Organic products, both animal and crops are increasingly attractive to farmers with high lucrative values and sales, thus, organic agriculture production and trade is rapidly expanding world over [1]. Research shows that there has been considerable growth in the number of organic dairy farming farms. In response to the necessity to fulfill the growing demand for animal products predicted for 2050 [2]-[3]. So that some conventional dairies are choosing to go through the lengthy organic conversion process which allows them to sell USDA certified organic milk. The response has been swift; total organic milk cows have increased from 38,196 in 2000 to 254,771 in 2011, representing over a five-hundred percent increase in just eleven years [4].Organic agriculture considers ecological, social and ethical impacts of farming [5]. The adoption of the principles and practices of organic agriculture potentially enhances soil fertility, biodiversity and minimizes land degradation, erosion, poisoning and other negative effects of chemical activities on the environment [6]-[7]-[8]. Organic dairy farming management shall aim to utilize natural breeding methods, minimize stress, prevent disease, progressively eliminate the use of chemical allopathic veterinary drugs (including antibiotics), and maintain animal health and welfare [9]. So the most important factors of organic dairy farming include: animal nutrition, animal breeding, veterinary and animal health, waste management, animal welfare and rights of workers [10].Nowadays, the development of rural areas has become a key point of social and agricultural policies at world levels because of the negative consequences that the depopulation of these areas leads to (loss of traditional and agricultural culture and degradation of agro ecosystems). This interest is reflected in the greater amount of resources and measures aimed at improving the environment and quality of life of rural areas, and at diversifying their economic activities on models of sustainable development [11].The livestock sector is of great importance for the sustainability of rural economies and many ecosystems; however, it also has a high environmental impact. Due to the growing demand for animal products, there is a need to design new livestock production systems that allow the combination of food security and sustainability. Organic dairy farming (especially its organic principles than regulations) may be a useful strategy to overcome the challenges of the agricultural sector (sustainability, food security, and food safety) while matching with consumers´ tendencies (animal welfare, health, environmental protection, etc.). Furthermore, organic dairy farming could be also an interesting strategy for the eternal rural development issue and the farms' decreasing profitability [12]. There is transition phase for any agriculture system to organic one affected by following factors:

1. Regulation and certification bodies
2. Implementation of organic farms (economic and productive performance)
3. Public subsidies (The Common Agricultural Policy (CAP))
4. Animal nutrition (Legislation and market)
5. Animal health, welfare, and technical management
6. Marketing of organic products and consumer's behavior (Kiefer etal, 2014; Lobley et al, 2013; Edwards et al, 2014; Hardie et al, 2014; Mena et al, 2012; Gillespie et al, 2013).

The implementation of organic dairy farming in Iran is facing many problems which include: 1. Existence of remote animal diseases that vaccination against them is necessary. (FMD, TB, etc.), 2. Lack of adequate controls borders on animal trafficking Disease transmission,

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especially in the East.3. Lack of standards, lack of necessary infrastructure (laws and regulations, produce enough organic matter, etc.) 4. Lack of awareness and lack of public information producers and consumers of organic dairy farming [19].However, in Iran, many agricultural and livestock production systems have the potential to become certified organic products, the system includes industrial complexes and livestock breeding and production of nomads[20]. There are a million and 15 thousand hectares of pastures and abundant natural resources in the province of Ardabil and it is one of the most important areas of animal husbandry. Livestock is the main occupation of the people and now also plays an important role in the local economy. Based on RCA[1],the livestock sector has the highest comparative advantage (46.5) among agricultural activities in Ardabil Province. In Ardebil, most of the milk (93%) produced by small rural and nomadic livestock raising [21]. There are many similarities between the system for nomadic sheep and goat livestock with organic dairy farming system [22]. In the nomadic livestock raising, livestock feed undisturbed and remote pastures. In the nomadic livestock raising, indigenous livestock breeds are bred that were compatible with the area. There is the least stressful environment for livestock. In nomadic livestock raising often used of traditional methods rather than chemical disinfectants, animals are kept in herds and often seasons are grazing in the natural pastures [23]. Due to the growing demand for organic dairy farming production, its importance in rural development and potential in Ardabil Province, analysis of components organic dairy farming is necessary. The purpose of this study was to identify dairy farmers' personal and professional characteristics and analyze the components of organic dairy farming in terms of Health, Safety and Veterinary, General management of dairy farming, Milking Management, Feed, Animal welfare, Facilities and waste of Dairy farmers view.

II.MATERIAL AND METHODS

The present study is quantitative in terms of its nature and non – experimental in terms of the degree of the variables and practical in terms of its goals. It has been carried out in the form of descriptive- correlative. The dairy farmers of Ardabil province in Iran constitute the statistical population of this research (N=119387). A number of 240 dairy farmers were selected as a sample by using randomized sampling method and Cochran's formula. Sampling was stratified random sampling method. Dairy farmers in the class were selected randomly. Dairy farmers in the study were interviewed by using a questionnaire which was the main tool for data collection. The survey instrument was designed in five parts: demographic characteristics of dairy farmers, environmental characteristics of dairy farm units, social characteristics of dairy farm units, the level of knowledge and awareness of dairy farmers about concepts of organic dairy farmers, economic characteristics of dairy farm units, the dairy farm units according to features organic dairy farm units, in different nominal distance and relative scales were studied. Their view of the various aspects of organic dairy farming components identified and analyzed.Content and face validity of the instrument was accomplished by a panel which consisted of the experts and professors of Tehran University and Iran Organic Association. A pilot test was conducted to determine the reliability of the questionnaire, and Cronbach's Alpha coefficient was confirmed for the scales of the questionnaire (α= 0.93) Spss 19 and Lisrel 8.8 as Well as Confirmatory factor analysis and descriptive statistics items (mean, mode, frequency, percentage, and standard deviation) were used for data Analysis.

III. RESULTS

Personal and Professional Characteristics of Dairy Farmers

According the findings of the research, the mean age of dairy farmers was 48 and more than half of them (60%) were in the age group 59 to 36 years, which showed that the population under study was old. The majority of the understudy dairy farmers, (86%) were men. nearly half of them are illiterate and often (99%) are endemic. Their work average experiences of dairy farming was 27 years.

Environmental Characteristics of Dairy Farming Units

Investigation on unit type of dairy farm units showed that the majority of them (73%) were traditional dairy farm units. the largest number in a variety of animals in dairy farm units, was dairy sheep with a total of 10 560 head of livestock.Duration of livestock grazing in the countryside, farms and orchards and pastures around the village showed that an average length of grazing in the countryside was five months, the average grazing in orchards and fields and meadows around the village was 7 months.

Social Characteristics of Dairy Farmers

Study of staff working in the dairyfarms showed that 68% of employees were men and 32% of employees were women. The majority of them (68%), had membership in the dairy farmers cooperative. Respondents were frequently used communication channels such as interaction with successful dairy farmers and veterinarians for receiving specialized information. Respondents participated in extension courses for artificial insemination (31%), general management (25%) and breeding of dairy livestock (10%).

Knowledge and Awareness of Indigenous Knowledge and Concepts of Organic Dairy Farming

Investigation on the level of knowledge of dairy farmers about organic concepts indicated that the concepts of organic milk and organic dairy farming were the highest levels of knowledge and awareness of the dairy farmers (see Table I).

1. . Revealed comparative advantage

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Table1. Distribution of Respondents based on knowledge of the concepts of organic dairy farming

Variable	N	Mean	Standard deviation	CV	Priority
The concept of organic milk	240	1.75	0.78	0.44	1
The concept of organic dairy farming	240	1.60	0.94	0.58	2
Organic milk production operations	240	1.46	0.86	0.58	3
Organic inputs such as organic feed, fertilizer and pesticides	240	1.30	0.93	0.71	4
Organic standards	240	0.61	0.78	1.27	5
Organic product inspection process	240	0.33	0.68	2.06	6
Standard certification process	240	0.29	0.70	2.41	7

Scales Used in the Above Table: No = 0, Very low = 1, Low = 2, Medium = 3, High = 4, Very High = 5
Mean= 1.86 Standard deviation=0.62

Economic Characteristics of Dairy Farming Units

Study the economic characteristics of dairy farming units showed that dairy farm gross income was 25485$ and the current cost of dairy farm was 13715$. Other findings regarding sales of milk showed that, milk intermediaries' method most used (40%) and milk collection centers milk lowest usage (5%) as well (see Table II).

Table 2. Distribution of milk selling methods in studied organic dairy farming units

Sales methods / Percent of sales	Selling milk to intermediaries		Traditional and domestic processing		Selling milk to dairy industry		Direct Selling milk in the local market		Selling milk to the milk collection centers	
	N	%	N	%	N	%	N	%	N	%
50%	24	10	42	17.5	7	2.9	15	6.3	1	0.4
100%	72	30	32	13.3	46	19.2	36	15	11	4.6
Total	96	40	74	30.8	53	23.1	51	21.3	12	5

Confirmatory Factor Analysis of Components of Organic Dairy Farming

Latent variable components of organic dairy farming organically is composed of six structures, including the welfare of animals (4markers), Health, Safety and Veterinary (7markers), feed (6markers), equipment for waste management (3markers), management of milking (7markers) and public administration Livestock(3 markers) (see Figure I). In order to confirm the components of organic dairy farming, Confirmatory Factor Analysis was performed on 30 items.Evaluating fitness of the model suggested for components of organic dairy farming shows that based on the information obtained about the components of organic dairy farming the ratio of Chi Square to the Degree of Freedom (X2.df<3) is 0.44, which is Less than (3). P-Value = (0.000), which is Larger than (0.05); RMSEA= (0.076), which is less than (0.08) Indicating the Significance of the Fitness test. Therefore our Model has a good fitness (Fig.1).The results in Table 2 shows that for all latent variables (structures), construct validity (CR) is more than 0.6 and Average Variance Extracted (AVE) is around or more than 0.5.AlsoT Values Obtained for each item of the table, are larger than (2). Thus, all items listed are significant and in general the model explained is significant.The amount reported for the index (RMSEA) shows that measurement error in the model is well controlled. Therefore, it is concluded that the markers used with the conceptual model shows reasonable agreement(see Table IV).

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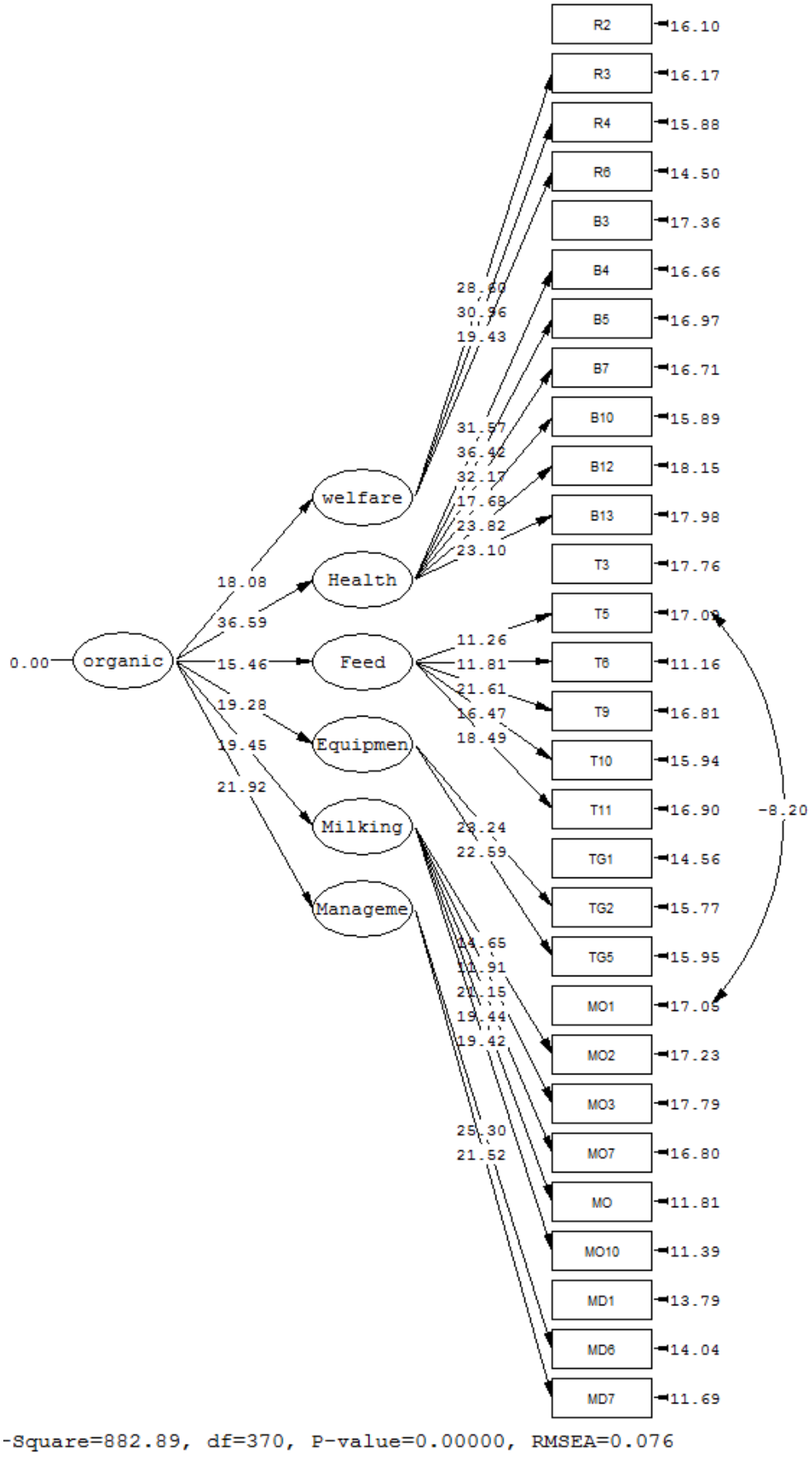

Fig. 1. Confirmatory Factor Analysis of components of organic dairy farming

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Table 3. Results of Confirmatory Factor Analysis of components of organic dairy farming

Latent Variables	COD	Markers	Standard coefficient	T value	R^2	Standard error	
Health, Safety and Veterinary	B3	Disinfected and sprayed with legitimate livestock units (using a flamethrower)	0.60	0.64	17.36	0.36	CR=0.76 AVE= 0.49
	B5	First aid facilities at the farm	0.60	0.64	36.42	0.36	
	B4	Veterinary medicine storage facilities in accordance with organic standards	0.59	0.65	31.57	0.35	
	B7	Sign up drug information (intervals and type of medication) in animals treated	0.59	0.65	32.17	0.35	
	B10	Having accurate vaccination program allowed each year	0.53	0.72	17.68	0.28	
	B12	Visit the vet regularly inspect livestock units	0.53	0.72	23.82	0.28	
	B13	Chemical and medicines in stock and out of reach of animals	0.52	0.73	23.10	0.27	
General management of dairy farm	MD1	Identify all the animals	0.72	0.48	21.52	0.52	CR=0.72 AVE= 0.57
	MD6	Having shown for individual identification of livestock	0.68	0.54	25.30	0.46	
	MD7	Daily Record animal feed	0.66	0.56	13.79	0.44	
Milking Management	MO	Adjust the speed of suction machine milking in the milking by machine	0.69	0.53	19.44	0.47	CR=0.74 AVE= 0.51
	MO10	Rinse thoroughly and disinfect the milking machine, crab, milk coolers	0.69	0.52	19.42	0.48	
	MO7	The teat disinfection after milking	0.56	0.69	15.21	0.31	
	MO1	Breast wash with warm water and dried before milking.	0.54	0.71	17.05	0.29	
	MO2	Remove and clean the hair on the back and around the breast livestock	0.49	0.76	14.65	0.24	
	MO3	Clean the milking in the milking person manually	0.44	0.81	11.91	0.19	
Animal Feed	T9	Kept animal feed in good condition (no mold contamination and corruption like fodders, black silo, etc.)	0.58	0.66	21.61	0.34	CR=0.70 AVE= 54
	T6	Buy produced animal feed(production and feed ingredients labeled with location information)	0.57	0.67	11.81	0.33	
	T11	Use clean utensils and equipment for animal feed or animal feed transport	0.55	0.69	18.49	0.31	
	T10	Feed storage to prevent mold formation Feed	0.54	0.71	16.47	0.29	
	T3	Remove unhealthy diet livestock feed such as hay musty, moldy bread, black silo	0.51	0.74	17.76	0.26	
	T5	Animal nutrition feed commensurate with the size, composition and age of the animal	0.44	0.80	11.26	0.20	
Animal welfare	R4	enough Light to animals place	0.62	0.62	30.96	0.38	CR=0.63 AVE= 0.52
	R3	The ability to wash and disinfect the animal	0.62	0.61	16.17	0.39	
	R2	Having adequate ventilation (natural or synthetic) animals place	0.60	0.63	16.10	0.37	
	R6	The status of space to relax and freely move animal	0.58	0.40	19.43	0.33	
Facilities and waste management	TG1	facilities of emptying and washing drinkers	0.64	0.60	14.56	0.40	CR=0.65 AVE= 0.48
	TG2	Regular withdrawal from the area of livestock	0.61	0.63	23.24	0.37	
	TG5	Health manger (concrete or metal) usage	0.61	0.63	22.59	0.37	

IV. DISCUSSION

As the results showed dairy farmers majority were middle-aged and had low literacy levels. Which makes it difficult to use the components of organic dairy farming. Other studies [9]-[24]-[25] in this direction as indicated that lack of awareness and low levels of literacy of farmers, lack of information about organic production methods is an impediment to the application of organic farming. Majority of dairy farm units were traditional and livestock grazed on pasture an average of 5 to 7 months. So dairy farming systems in Ardebil is Grassland Based

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Systems [26] and have the potential to become certified organic products [20]-[22]. This surveys indicate farmers' organizations were active and Dairy farmers were often interact with veterinarians and successful dairy farmers to exchange information. They also had active participation in extension courses. But dairy farmers' knowledge about organic farming concepts was insufficient andinefficient. To transition to organic dairy farms Chander et al (2011) and Ozguven (2012) stressed that the development of training programs to develop organic knowledge and promote organic farming skills [27]-[28]. Other finding of the research showed that Intermediaries were active in determining the milk price as they buy milk in very low prices of dairy farmers and their incomes were lower.In fact, dairy farmers don't have easy access to the market in Ardebil. While the studies conducted by Stolze and Lampkin (2009), showed that market infrastructure has a more effective role in supporting organic production. According to research findings confirmatory factor analysisof components of organic dairy farming indicated that various Dimensions include: 1. Health, Safety and Veterinary 2. General management of livestock 3. Milking Management 4. Animal Feed 5. Animal welfare 6.Facilities and waste management, were important factors of organic dairy farming [29]. Among above factors, Health, Safety and Veterinary factor and General management of dairy farm were the most effective components of organic dairy farming and should be considered in conversion to organic dairy farms.In this regard,the researchers reported in their study factors such as animal nutrition, animal breeding, veterinary and animal health, waste management, animal welfare and workers' rights as a component of organic farming[30]-[31]-[32]-[33]-[34]-[35].

V. CONCULSION

Increased consumer awareness of food safety issues and environmental concerns has contributed to the growth in organic dairy farming over the last few years. Now-a-days quality and health conscious consumers are increasing and they need environmentally safe, chemical residue-free healthy foods, along with product traceability and a high standard of animal welfare. These can be ensured by organic production methods. Organic farming can provide quality food without adversely affecting the soil health and the environment. In order to transition organic dairy farming it is necessary to take care of certain points like sourcing of organic inputs like feeds and fodder, disease prevention, cost of production and maintaining animal health, etc. In fact, organic farming factors must be met. Thus it is essential to organize extension training courses in the field of organic dairy farming for dairy farmers and encourage them to participate actively. Also it should be trained extension agents to promote organic dairy farming. Although, the authorities should provide essential economic, policy and legal infrastructure to convert to organic dairy farms.

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