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Structural Features, Biosecurity and Animal Welfare Assessment in Sheep Farms in Yozgat Province, Türkiye

A. Aslan[1], H. Tüfekci[2*]

[1]*Department of Animal Science, Institute of Graduate Education, Yozgat Bozok University, 66100, Yozgat, Türkiye*

[2]*Department of Animal Science, Faculty of Agriculture, Yozgat Bozok University, 66100, Yozgat, Türkiye*

ABSTRACT: In this study, it was aimed to evaluate the sheep production enterprises in Yozgat province located in Central Anatolia Region of Türkiye in terms of production characteristics, general characteristics, biosecurity practices and animal welfare. The material of the study consisted of questionnaire, observation and measurement data obtained from 180 sheep production enterprises in Yozgat province. In the study, the general characteristics of the enterprises, flock management practices, shelter characteristics, feeding practices, health protection practices, biosecurity practices and welfare assessment were determined. As a result, sheep production in Yozgat province is mostly carried out with traditional methods and in the form of family enterprises. It is seen that some practices in the enterprises have deficiencies in terms of compliance with biosecurity parameters. In terms of welfare, according to the protocol developed from the ANI 35 L system, it was determined that the sheep farming enterprises in Yozgat province are mainly in the medium score categories in terms of protection from heat, protection from cold, suitable light and ventilation and number of drinkers from the parameters of shelter conditions; medium in terms of parameters other than milking parlour in terms of structure and equipment condition parameters; and high in terms of animal health parameters.

Key words: ANI 35 L; Animal Welfare; Biosecurity; Sheep; Structural Propertie

Corresponding Author:
Hacer Tüfekci, Department of Animal Science, Faculty of Agriculture, Yozgat Bozok University, 66100, Yozgat, Türkiye
E-mail address: hacer.tufekci@bozok.edu.tr

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INTRODUCTION

Animal husbandry is a widespread livelihood activity in the world. The fact that small ruminants are resistant to environmental factors and diseases gives them an important place in animal husbandry activities both in the world and in our country. In Türkiye, the favorable agricultural structure and natural and economic conditions enable sheep and goat production to be carried out widely, and sheep production has an important place among livestock production activities. According to the latest data, there are 45.177.690 sheep in our country (FAO, 2023). Sheep production activity, which is increasing and developing, is mainly carried out for meat, milk, fleece, and leather production in Türkiye and has an important place in animal products. While it is important to obtain products and make a profit in sheep production, it is extremely important to ensure and protect animal health and welfare that will enable this profit.

Biosecurity measures include measures taken to protect against infectious diseases, pests, and biological threats that can be seen in humans and animals. Consumer health, satisfaction, and food safety are directly related to biosecurity and sustainable production with healthy animals in enterprises (Köseman, 2008). At the same time, biosecurity is an issue related to animal welfare and covers all measures to prevent the entry and spread of disease agents into the living spaces of living organisms (Berg, 2006). Biosecurity practices are the insurance of productivity and herd health in animals. Diagnosis and treatment of diseases are quite costly and risky in terms of food safety in some periods, and the emergence and spread of diseases can be reduced by taking preventive measures. For this reason, biosecurity rules have been developed in modern production. The main biosecurity rules in the livestock sector can be expressed as the elimination of disease agents, strengthening the immune system, ensuring hygiene, and creating healthy living conditions for animals, as well as providing experienced and knowledgeable personnel. In addition, since improving the welfare of livestock may cause changes in costs in herd management practices and subsequent market stages, it is a necessity that the provision of livestock welfare be economical (Grethe, 2017).

The concept of animal welfare refers to the quality of life of the animal. While injuries, diseases, and unbalanced nutrition are among the factors that negatively affect animal welfare, the presence of welfare in animals can be determined by normal behavioral functions and physiological activities, reproduction, and growth characteristics (Fraser, 2008). A stressor is a stimulus that initiates a stress response and is an inevitable consequence of today's husbandry practices. The duration and type of stress can vary (Cappellozza and Marques, 2021). In addition, the animal's response to a stressor may vary according to the interactions of various factors such as sex, age, physiological status, breed, duration, type, and intensity of the stressor, nutrition, shelter, climate, husbandry practices, and environment (Kumar et al., 2023; Khalifa, 2003).

Welfare for farm animals is the state of being in harmony with their environment, being able to adapt to the environment in which they live without any pain or discomfort, and being healthy. Animal welfare is closely related to the concepts of "well-being and animal health," and the assessment of these two conditions means the assessment of animal welfare in practice (Fraser et al., 1997; Broom, 1991; Duncan, 2005; Duncan, 2002; Dantzer, 2001). Welfare assessment is recognized as an important part of an efficient, productive, and sustainable livestock production system. This requires the development of species-specific protocols and the assessment of animal welfare at the farm level (Blokhuis et al., 2010; Blokhuis et al., 2013; Broom, 2008). These parameters also tell us the animal's response to environmental influences and help to evaluate animal welfare more accurately (Ingenbleek et al., 2011). The determination and assessment of animal welfare is a multi-dimensional and multi-criteria approach (EFSA, 2012; Tiezzi et al., 2019). The main factors affecting the welfare of farm animals are management practices, the physical environment, and the resources available to them. Animals adapt to these inputs with their behavioral and physiological characteristics (AWIN, 2021).

Farm-level welfare assessment can be used by farmers as an advisory tool, as a source of information for management, and as a component of quality assurance schemes for consumers. Consumers have a high interest in farming and related animal welfare standards due to the positive public health implications of impacts on the health and production of animals. More and more consumers are becoming aware of animal welfare in terms of public health, food safety, and environmental protection (Rahaman et al., 2021). In order to ensure sheep welfare in enterprises, there are rules and standards to be followed and paid atten-

tion to in terms of health and care management practices and in-shelter conditions. These practices can help breeders identify unfavorable welfare conditions and encourage the improvement of animal welfare.

MATERIALS AND METHODS

In this study, 180 sheep production enterprises operating in Yozgat province, located in the Central Anatolia Region of Türkiye, were selected as material. Data were obtained through face-to-face questionnaires, observations, and measurements in these enterprises. In the study, basic questions were asked, and observations and measurements were made to determine the general characteristics of the enterprises, the structural status of the enterprises, shelter characteristics, feeding practices, animal breeds in the enterprises, herd management, health protection, biosecurity, and animal welfare. In the study, the compliance of sheep farms with animal welfare criteria was evaluated using the protocol developed from the ANI (Animal Needs Index) 35-L system in order to evaluate the welfare of sheep. Within the scope of the study, the enterprises were visited, and animal welfare was evaluated according to the method developed by Martini et al. (2015). In this method, a total of 17 different parameters were taken into consideration: 3 for animal health, 7 for shelter, and 7 for structure and equipment condition. All evaluations made by observation were determined by two people (a veterinarian and a zootechnician, an agricultural engineer). Feeder size, drinker size, and surface area per unit animal were determined by measurement. A stratified random sampling method was used to determine the number of enterprises within the scope of the study. The data obtained were analyzed using the SPSS Statistical Package Program (SPSS, 2016).

RESULTS

General characteristics of enterprises, herd management and feeding practices

The flock sizes of the sheep farms where the study was carried out were determined as follows; 43.9% 51-100 heads, 28% 101-250 heads, 16.1% 251-500 heads, and 11.7% 1-50 heads. Most of the breeders reported that they established their enterprises with their own means (83.3%), that their enterprises were their own property (93.9%), that they received any support from the government (78.9%), and that they wanted to continue their livestock production activities (82.8%). General characteristics of the enterprises, herd management, and feeding practices are given in Table 1. The breeders were generally in the middle age group, and 42.2% of them were high school graduates. While the number of households was generally between 1-4 people, the experience of the breeders in this business was mostly between 10-30 years. 51.7% of the breeders do this work as a contribution to livelihood, 48.3% do this work as a contribution to livelihood, 48.3% do this work as a contribution to livelihood - habit - sole source of livelihood and 55% of the breeders stated that they produce for their own needs - sacrifice - production, 35.6% for sacrifice and production and 9.4% for additional income. When the status of shepherds in the enterprise is examined; 23.3% of the breeders stated that they make use of the family labor force, 22.8% stated that they have a shepherd in addition to the family labor force, and 53.9% stated that they have a shepherd from outside.

In our country, sheep production is generally carried out with disease-resistant, low-yielding domestic breeds. In Yozgat province, the most common breed of sheep in the enterprises is Akkaraman sheep (81.1%) and it was determined that the breeders mostly provide production sheep from their own enterprises (96.7%). In the enterprises where the study was carried out, 50.6% reported that they kept records and 49.4% reported that they did not keep records. 16.7% of the breeders stated that they generally milked by hand for 1-2 months, one time only, together with women, men and shepherds and that they utilized the milk obtained as cheese- yogurt and raw milk within the enterprise. 83.3% of the breeders reported that they did not milk and the milk was used for feeding the lambs. Most of the breeders (80.6%) in the farms where the study was conducted stated that they sheared by machine once a year and they utilized the obtained fleece by giving it in return for the shearing fee. Ram siring is carried out in September-October, lamb births take place in February and March and the ram siring period is reported to be 30-45 days. All of the breeders reported that they made prenatal preparations in their enterprises by preparing the birth chamber, separating the mother, not letting her out to pasture and supplementary feeding. All of the breeders reported that they did not perform castration, tail cutting and horn blunting on lambs.

Almost all of the breeders stated that they used straw (barley, wheat, lentil) as a roughage source and barley and factory feed as concentrate feed sources. It was reported that 27.8% of the breeders used supplementary feeding for ram siring-birth lambs, 32.2% for ram-siring-birth lambs, and 28.9% for lambs. In

Table 1. General characteristics of enterprises, herd management and feeding practices

Breeders age	**n**	**%**	**Experience**	**n**	**%**
19-30	23	12.7	0-5	19	10.6
31-40	47	26.1	6-10	32	17.8
41-50	53	29.4	11-20	57	31.7
51-60 and above	57	31.8	21-30	52	28.8
Education	**n**	**%**	30-40 and above	20	11.1
Primary school	49	27.2	**Households**	**n**	**%**
Middle school	43	23.9	1-2	66	36.7
High school	76	42.2	3-4	76	42.2
University	12	6.7	5-7 and above	38	21.1
Reasons for farming	**n**	**%**	**Record keeping on farms**	**n**	**%**
Contribution to livelihood	93	51.7	Yes	91	50.6
Contribution to livelihood, habit, sole source of livelihood	87	48.3	No	89	49.4
Purpose of production	**n**	**%**	**Breeds of sheep**	**n**	**%**
Sacrifice-breeding	64	35.6	Akkaraman	146	81.1
Own needs-sacrifice-breeding	99	55.0	Kangal	34	18.9
Additional income	17	9.4	**Breeding sheep supply**	**n**	**%**
Shepherd status	**n**	**%**	From own farm	174	96.7
Family labour force	42	23.3	Livestock market-neighboring farms	6	3.3
Family labour-shepherd	41	22.8	**Breeding ram supply**	**n**	**%**
Shepherd	97	53.9	From own farm	127	70.6
Feeding time in pasture (months)	**n**	**%**	Livestock market-neighbouring farms	53	29.4
6	20	11.1	**Mating period**	**n**	**%**
7-8	150	83.3	30 days	132	73.3
10	10	5.6	45 days	48	26.7
Grazing with different breeds in the pasture	**n**	**%**	**Age at first breeder (months)**	**n**	**%**
Yes	164	91.1	12	18	10
No	16	8.9	15	100	55.6
Additional feeding status	**n**	**%**	18	32	34.4
Mating-birth-lamb	50	27.8	**Breeding period (female)**	**n**	**%**
Mating-birth	58	32.2	3	69	38.3
Lamb	52	28.9	4	58	32.2
Not doing	20	12.1	5-6	53	29.5
Criteria for animal feeding	**n**	**%**	**Breeding period (male)**	**n**	**%**
Conditions of the animals	28	15.6	2	79	43.9
Pasture status-feed intake status	28	15.6	3	60	33.3
Economic conditions	79	43.8	4-5	41	22.8
All	45	25.0	**Status of milking**	**n**	**%**
Shearing status	**n**	**%**	Yes	30	16.7
Yes	145	80.6	No	150	83.3
No	35	19.4			

the study, 83.3% of the breeders reported that they let their animals benefit from pasture for 7-8 months. In addition, breeders reported that different species were grazed together in the pastures.

Shelter features and health protection applications in enterprises

Data on shelter characteristics and health protection practices are given in Table 2. The reason why closed type barns are preferred in Yozgat province is that semi-arid continental climate conditions are dominant in the region. In 48.3% of the enterprises where the study was carried out, 48.3% had a sick animal compartment; 64.4% had a birth compartment; 82.2% had a lamb compartment; 94.4% had a walking area, and 97.8% did not have a milking parlor. When the building materials of the shelters were analyzed, it was stated that the wall material was brick-brick

(37.2%), the roof material was tile (46.8%), the floor soil (58.9%), the feeder material was wood (80.0%) and the drinker material was sheet metal (53.9%). Nearly all of the enterprises (94.4%) have a walking area in the barn.

While 68.9% of the breeders reported that they kept regular health records, 31.1% reported that they did not keep regular health records. In addition, only 30.5% of the breeders stated that they had regular health checks carried out by a veterinarian in their enterprises. Almost all of the breeders (95.0%) reported that they had their animals vaccinated in accordance with the vaccination calendar. It was reported that manure was cleaned, and internal and external parasite control was carried out once or twice a year in all of the enterprises. Almost all of the breeders stated that they regularly apply disinfection once or twice a year. In addition, it was reported that animals were not bathed in most of the enterprises and foot bathing was not used in the barn.

Biosecurity practices in enterprises

The data on biosecurity practices on the farms where the study was conducted are presented in Table 3. 55.5% of the breeders stated that they had heard the concept of biosecurity before and 44.5% stated that they did not know the concept of biosecurity. Regarding the implementation of biosecurity measures in the enterprises, 44.4% of the breeders reported quarantine practices, 33.3% reported controlled entry-exit to the enterprise, 20.5% reported taking measures during different enterprise visits and 1.7% reported keeping records. 38.9% of the breeders reported that biosecurity rules should be implemented to protect against diseases, 36.1% for the health and welfare of animals, 8.3% because it is a mandatory situation, and 16.7%

Table 2. Shelter characteristics and health protection practices in enterprises

Shelter capacity	**n**	**%**	**Shelter type**	**n**	**%**
50-100	34	18.9	Closed	176	97.8
101-200	66	36.7	Semi-open	4	2.2
250-400	50	27.8	**Shelter floor material**	**n**	**%**
450-700	30	16.6	Soil	106	58.9
Lamb compartment	**n**	**%**	Stone-concrete	74	41.1
There is	148	82.2	**Shelter wall material**	**n**	**%**
None	32	17.8	Adobe	23	12.8
Birth compartment	**n**	**%**	Concrete	33	18.3
There is	116	64.4	Stone	57	31.7
None	64	35.6	Brick, briquette	67	37.2
Patient animal compartment	**n**	**%**	**Shelter roof material**	**n**	**%**
There is	87	48.3	Roof tile	84	46.8
None	93	51.7	Sheet metal-wooden material	94	53.2
Keeping regular health records	**n**	**%**	**Manger material**	**n**	**%**
Yes	56	31.1	Wooden material	144	80.0
No	124	68.9	Sheet metal	29	16.1
Regularly health check	**n**	**%**	Concrete	7	3.9
Himself	85	47.2	**Drinking material**	**n**	**%**
Veterinary	55	30.5	Sheet metal	97	53.9
Not done	40	22.3	Plastic	36	20.0
Compliance with the vaccination schedule	**n**	**%**	Stone-concrete	47	26.1
Yes	171	95.0	**Fighting internal and external parasites**	**n**	%
No	9	5.0	Once-summer	150	83.3
Regular disinfection	**n**	**%**	Twice-spring-summer	30	16.7
Yes, once a year	87	48.3	**Bath application status**	**n**	**%**
Yes, twice a year	70	38.9	Yes	109	60.6
No	23	12.8	No	71	39.4
Internal-external parasite control method	**n**	**%**	**Foot bath use**	**n**	**%**
Drug-injection-calcification	148	82.2	Yes	4	2.2
Injection-drug	32	17.8	No	176	97.8

because it provides economic benefits and protects against diseases. When the situations that prevent biosecurity practices in enterprises were analyzed, 32.2% of the breeders reported that they did not have enough information, 38.3% reported that the cost was high and 29.4% reported that they did not have time.

Table 3. Biosecurity practices in enterprises

Definition of biosecurity	**n**	**%**	**Implementing biosecurity measures on farms**	**n**	**%**
Yes, I know	100	55.5	Quarantine practices	80	44.4
No, I don't know	80	44.5	Controlled entry-exit to the enterprise	60	33.3
Is biosecurity important?	**n**	**%**	Taking precautions during different enterprise visits	37	20.6
Yes	144	80.0	Record keeping	3	1.7
No information	36	20.0	**Why biosecurity rules should be applied**	**n**	**%**
Situations that prevent the implementation of biosecurity on the farm	**n**	**%**	For disease prevention	70	38.9
I don't have enough information	58	32.2	For the health and welfare of animals	65	36.1
Excess cost	69	38.3	In mandatory cases	15	8.3
No time	53	29.4	Economic benefit-disease prevention	30	16.7
Issues to consider when buying livestock	**n**	**%**	**Hygiene of visitors to the farm**	**n**	**%**
I choose myself by talking to the seller, examining the animal enterprises I know and registering animals	161	89.4	I will pay attention	158	87.8
I don't buy animals from outside	19	10.6	I don't pay attention	22	12.2
Testing following a livestock purchase	**n**	**%**	**Visitor record keeping status**	**n**	**%**
Yes	9	5.0	Yes	16	8.9
No	148	82.2	No	164	91.1
Sometimes	23	12.8	**The status of visitors entering the barn directly**	**n**	**%**
Reasons for not getting tested	**n**	**%**	Yes	25	13.9
I don't think it's useful	12	8.1	No	155	86.1
It was not offered to me before	48	32.4	**Visitors' state of clothing**	**n**	**%**
I don't know about the tests.	45	30.4	Disposable apron-boots	23	12.8
Testing is expensive	43	29.1	I don't pay attention	157	87.2
Quarantine application of purchased livestock	**n**	**%**	**Visitors' use of disinfectant foot baths**	**n**	**%**
Yes	36	20.0	Yes	14	7.8
No	89	49.4	No	166	92.2
Sometimes	55	30.6	**Visitors may only come into contact with healthy and mature animals**	**n**	**%**
Feed delivery vehicles-users	**n**	**%**	Yes	108	60.0
Can't enter the barn	161	89.4	No	72	40.0
They can enter the enterprise as they wish	19	10.6	**I change my clothes and boots when I visit other farms**	**n**	**%**
Milk collector vehicles-users	n	%	Yes	26	14.4
Can't enter the barn	161	89.4	No	154	85.6
They can enter the enterprise as they wish	19	10.6	**Protection of feed raw materials from pests in the farms**	**n**	**%**
Veterinarian	**n**	**%**	By keeping it in a confined space	33	18.9
They can enter the enterprise and the barn as they wish	164	91.1	Well maintained and regularly checked for rodents	72	40.0
Can't enter the barn	16	8.9	Well maintained-by regular inspection and cleaning against rodents	74	41.1
Neighbouring farms owners	**n**	**%**	**Knowledge of zoonotic diseases**	**n**	**%**
Can't enter the barn	151	83.9	Yes-I take the necessary precautions	132	73.3
They can enter the enterprise as they wish	29	16.1	No-I don't know	48	26.7

In the enterprises where the study was carried out, 89% of the breeders reported that they purchased animals from the registered enterprises they knew by selecting the animals themselves and requesting the necessary information from the seller. However, 82.2% of the breeders reported that they did not perform any health tests on the animals following the animal purchase process. When the quarantine application status of the animals purchased in the enterprises was analyzed, 20% of the breeders stated that they applied quarantine, 49.4% stated that they did not apply quarantine and 30.6% stated that they sometimes paid attention to quarantine application.

In the enterprises where the study was conducted, 87.8% of the breeders reported that they paid attention to the cleanliness of the external visitors to their enterprises, while 87.2% of the breeders stated that they did not pay attention to the use of disposable aprons-boots by the visitors to their enterprises. In addition, 92.2% of the breeders reported that there was no disinfectant foot bath for the visitors and 91.1% of the breeders reported that they did not keep an enterprise visitor record. 86.1% of the breeders reported that visitors were not allowed directly into the barn and 60% of the breeders reported that visitors could only come into contact with healthy and adult animals. Most of the breeders reported that feed delivery vehicles and users, milk collector vehicles and users and owners of neighboring farms, who can enter and exit the enterprise from time to time, can enter the enterprise as they wish, but they cannot enter the barn. However, 91.1% of the breeders stated that veterinarians can enter the enterprise and the barn as they wish.

Regarding the protection of feed raw materials from pests in the enterprises, 18.9% of the breeders reported that they kept them in a closed area, 40% reported that they kept them in a well-kept area and made regular checks against rodents, and 41.1% reported that they kept them in a well-kept area and made regular checks and cleaning against rodents. In addition, 73.3% of the breeders stated that they were informed about zoonotic diseases and that they took necessary precautions in their enterprises.

Evaluation of welfare in enterprises

The characteristics of the enterprises according to the parameters of shelter conditions are given in Table 4, the characteristics according to the parameters of structure and equipment status are given in Table 5 and the characteristics according to animal health parameters are given in Table 6. It is seen that 22.8% of the enterprises in which the study was carried out have inadequate facilities and very low levels of maintenance conditions, which are in the range of 0-4 points, and 75% have adequate facilities and moderate maintenance conditions, which are in the range of 5-6 points. When the enterprises were evaluated in terms of surface area per unit animal, 58.9% of them had a surface area below 1.85 m^2 and 41.1% had a surface area above 1.85 m^2. It was observed that 37.2% of the enterprises had no heat protection and 27.8% had no cold protection; 55% had adequate heat protection and 55.6% had adequate cold protection; 7.8% had adequate heat protection and 16.7% had excellent cold protection. In terms of appropriate light and ventilation, 26.7% of the enterprises were found to be poor, 66.7% were found to be good and 6.7% were found to be excellent. It was determined that the size of the feeder and the number of drinkers were in the range of 0-4 points in 7.8% and 16.7% of the enterprises; 5-6 points in 44.4% and 78.9% of the enterprises; and 7-10 points in 47.8% and 4.4% of the enterprises, respectively.

In sheep production, the main issues that need to be taken into consideration in order to ensure a good yield are a suitable ground, dry-clean barn, and each enterprise should use its own tools and equipment to maintain and disinfect them under appropriate conditions. In terms of cleanliness, the barns were found

Table 4. Characteristics of enterprises according to the parameters of accommodation conditions

Parameter	0-4		5-6		7-10	
	n	%	n	%	n	%
General status of animal facilities	41	22.8	135	75.0	4	2.2
Space allowance for each animal	106	58.9	-	-	74	41.1
Protection from heat	67	37.2	99	55.0	14	7.8
Protection from cold	50	27.8	100	55.6	30	16.7
Appropriate light and ventilation	48	26.7	120	66.7	12	6.7
Manger size	14	7.8	80	44.4	86	47.8
Drinking trough number	30	16.7	142	78.9	8	4.4

Table 5. Characteristics of enterprises according to structure and equipment status parameters

Parameter	0-4		5-6		7-10	
	n	%	n	%	n	%
Barn cleanliness	32	17.8	132	73.3	16	8.9
Floor cleanliness	26	14.4	134	74.4	20	11.1
Feeding area cleanliness	9	5.0	137	76.1	34	18.9
Drinking area cleanliness	22	12.2	141	78.3	17	9.4
Lying area cleanliness	27	15.0	133	73.9	20	11.1
Milking parlour condition	27	15.0	3	1.7	-	-
Condition of additional equipment	4	2.2	153	85.0	23	12.8

Table 6. Characteristics of enterprises according to animal health parameters

Parameter	0-4		5-6		7-10	
	n	%	n	%	n	%
Integument condition	23	12.8	38	21.1	119	66.1
Hoof condition	5	2.8	44	24.4	131	72.8
Evident pathologies	21	11.7	46	25.6	113	62.8

to be dirty in 17%, moderately clean in 73.3% and clean in 8.9% of the enterprises where the study was conducted. In terms of floor cleanliness, it was determined that 14.4% of the enterprises had dirty floors, 74.4% had moderately clean floors, and 11.1% had clean floor surfaces. Feeding area cleanliness, water drinking area cleanliness, and lying area cleanliness were determined to be between 0-4 points in 5%, 12.2% and 15% of the enterprises respectively; between 5-6 points in 76.1%, 78.3% and 73.9% of the enterprises and between 7-10 points in 18.9%, 9.4% and 11.1% of the enterprises. In 15% of the milking establishments, the milking parlor was evaluated as dirty and 1.7% as moderately clean. According to the evaluation made in terms of additional equipment status, 2.2% of the enterprises were evaluated as bad in the 0-4 point range, 85% were evaluated as medium in the 5-6 point range and 12.8% were evaluated as good in the 7-10 point range.

Skin condition was evaluated as bad in 12.8%, medium in 21.1% and good in 66.1% of the enterprises. Hoof condition was evaluated as poor in 2.8% of the enterprises, moderate in 24.4% and good in 72.8%. In the evaluations made in the enterprises regarding the significant pathologies in the animals, it was determined that they were very common in 11.7% of the enterprises, moderate in 25.6% and rare in 62.8% of the enterprises.

DISCUSSION

Stress factors that negatively affect animal welfare also constitute the cost of stress, along with the changes in biological functions that will occur in animals. Biosecurity practices applied within the scope of additional measures to be taken for animal health are a very important issue in terms of sheep production. Increased sensitization to animal welfare has led to the need to determine the current welfare level for farm animals of various species. A good breeder is a necessity to ensure animal welfare in sheep production. Observation of behavioral changes or signs of disease by the breeder and taking appropriate measures are critical for the welfare and productivity of the flock (Vaarst et al., 2004). Since the breeder is the person who determines and follows the flock management practices, all breeders should be aware of the welfare needs of their sheep and have the ability to protect the flock under any circumstances.

Production objectives may vary depending on the habits of the producer and market opportunities (Dellal et al., 2002). Structural and managerial characteristics of sheep farms and the socio-economic level of breeders affect developments in the sector (Köseman et al., 2022). When the general characteristics of the enterprises in which the study was carried out were analyzed, practices such as age, education level, experience, production purposes, and shepherd status in the enterprise were generally similar to the results of the studies carried out in different regions of our country. In our country, sheep production enterprises are generally small and medium sized family enterprises. When the herd management practices were evaluated, it was determined that the Akkaraman breed was present in the enterprises, and they provided their female

production needs from their enterprises. Half of the breeders kept records only in some practices in the enterprises, and the general of the breeders did not milk. The majority of Akkaraman breed breeders in the region can be associated with the fact that the breed is satisfied with its productivity in extensive conditions and adapts very well to the regional conditions. In addition, it is seen that bathing is not applied to the animals during shearing in the enterprises. Sheep production is mostly based on pasture and 80-90% of the feed requirements of animals in most of our regions are met from natural grazing areas such as meadows, pastures and plateaus. On the farms where the study was conducted, all of the breeders used pasture for their animals for periods ranging from 6-10 months. The majority of breeders feed their animals more frequently at various times. It can be said that the situation of supplementary feeding is related to improvements in increasing the productivity of animals in certain periods and the current composition of the pastures in the region.

Determination of the total animal capacity in enterprises is necessary to ensure welfare conditions. Shelters should be built according to the determined capacity; the number of animals and the necessary compartments should be calculated according to the capacity. The layout plan of the barn should be prepared by taking into account issues such as animal movements, ease of work, work efficiency in order to ensure animal welfare. In addition to measurements, animal needs should also be taken into consideration in the construction of the barn. Inappropriate shelter conditions can have a negative impact on animal welfare and cause stress for animals (Ninomiya, 2014). Climatic conditions have an important effect on the change in shelter type according to regions (Faerevik et al., 2005). The reason why closed type barns are preferred in Yozgat province is that semi-arid continental climate conditions are dominant in the region. In addition, it can be said that the shelter capacity is sufficient, the necessary partitions are available, and the building materials are suitable for the regional conditions. Nearly all of the breeders have a sufficient walking area for animals in their enterprises.

For profitable and efficient production in sheep production enterprises, the animals in the enterprise must be healthy. The enterprises that make their livelihoods from sheep production and produce for the market should focus on ways to protect them from diseases beyond treating their sick animals. It is also known that diseases seen in enterprises cause serious economic losses as well as various health problems. Therefore, importance should be given to health protection practices in enterprises against various diseases, yields, and animal losses. Record keeping for farm animals is a very necessary practice for animal care, animal welfare, health controls, animal management, animal production, animal inspection, regulatory information and research opportunities, meeting and coordinating the demands for products, and auditing farm records (FAWC, 2011). It is also very important that the records are complete, accurate, secure and accessible. Although it is stated that records are generally kept in different areas in enterprises, there are deficiencies in health record keeping practices, and their importance is not sufficiently understood. Therefore, it is necessary to inform the breeders about this issue and to organize trainings in order to understand its importance. Removing the manure from the barn during certain periods and preventing its accumulation in the barn is of great importance in terms of both barn cleaning and animal health and welfare. On the farms where the study was conducted, it was stated that the manure was definitely removed from the barn in certain periods. Especially in the control of external parasites in sheep, in addition to providing hygiene in the barn, body bathing is a practical and effective practice. Breeders have deficiencies in the use of body baths, especially foot baths.

Biosecurity is important to prevent disease transmission between animals on farms and from farm to farm. Biosecurity measures on farms can be applied differently depending on the breeding and production conditions (Sahlström et al., 2014). Biosecurity in livestock farms is an important part of disease prevention and control, and this applies to live animal contacts as well as indirect contacts, e.g., through various carriers traveling to different farm visits. Infectious animal diseases can also have a major negative impact on animal health, animal welfare, food production and, in the case of zoonotic diseases, public health. Monitoring animal movements is of great importance for disease control. Especially in cases where animals are supplied to the enterprise from outside, there are points that should be carefully emphasized. It is seen that breeders generally procure animals from registered enterprises, but do not have any health tests following the purchase process and do not pay enough attention to quarantine practices. In animal husbandry practices, there is definitely mobility between enterprises and the entry and exit of visitors. At the same

time, it is well known that contacts between livestock enterprises are central to the spread of infectious diseases. Therefore, it is a necessity to take the necessary precautions in this regard. Most of the breeders stated that feed delivery vehicles and users, milk collector vehicles and users, and owners of neighboring enterprises can enter the enterprise as they wish, but they cannot enter the barn, while veterinarians can enter the enterprise and the barn as they wish. Although biosecurity is a new concept for enterprises, the issue is not fully known and breeders exhibit different approaches that are right and wrong. Especially in recent years, the concept of "biosecurity" has been used intensively within the scope of safe food production and has been the subject of a number of studies, but its importance has not yet been fully realized. It is seen that sheep breeders do not have enough knowledge and practice in terms of biosecurity practices. In order to create the necessary awareness on this issue, it is necessary to carry out training and practices as well as controls.

As a general approach, improving animal welfare should start with an assessment of the risks and opportunities in the whole system or production chain, looking for improvements that are practical. The assessment should include a science-based assessment of the needs and welfare of animals and evaluations to identify the causes of suboptimal welfare (Rahaman et al., 2021; Simitzis et al., 2021). In recent years, it has been reported that there has been an increase in the methods available to assess animal welfare in studies conducted on different species (Blokhuis et al., 2010; Phythian et al., 2013; Hemsworth et al., 2015). It is seen that 22.8% of the enterprises in which the study was carried out have inadequate facilities and very low levels of care conditions, which are in the range of 0-4 points, and 75% have adequate facilities and medium levels of care conditions, which are in the range of 5-6 points. Meşe and Karakuş (2019) reported that 32.79% of the enterprises were in the range of 0-4 points and 67.21% were in the range of 5-6 points. When the enterprises were evaluated in terms of surface area per unit animal, 58.9% had a surface area below 1.85 m^2 and 41.1% had a surface area above 1.85 m^2. It has been reported that there are rules to be followed and standards to be considered in terms of in-shelter conditions in sheep production and that meeting these standards has an important effect on the welfare of animals (Sevi et al., 2009). Meşe and Karakuş (2019) reported in their study that 67.21% of the enterprises had a surface area below 1.85 m^2 and 32.79% had a surface area above 1.85 m^2. Adequate ventilation and lighting should be provided for the health and welfare of animals. It was determined that 26.7% of the enterprises were in the range of 0-4, 66.7% in the range of 5-6, and 6.7% in the range of 7-10 points in terms of appropriate light and ventilation. Martini et al. (2015) found values of 7.5, 6.4, and 6.8 in biodynamic, conventional and organic production systems, respectively. He also reported that the differences between provinces (2.0-8.5 points) were significant. In order to ensure a good yield in sheep production, the most important issues to be considered are a suitable ground, dry and clean barn, and each enterprise should use its own tools and equipment and keep and disinfect them under appropriate conditions.

In terms of cleanliness, the barns were found to be dirty in 17%, moderately clean in 73.3% and clean in 8.9% of the enterprises where the study was conducted. In terms of floor cleanliness, it was determined that 14.4% of the enterprises were dirty, 74.4% were moderately clean and 11.1% were clean. In shelters, the floor must provide sufficient conditions to prevent animals from slipping and falling. In the study conducted by Meşe and Karakuş (2019), the barns were evaluated as dirty in 24.59% of the enterprises, moderately clean in 67.21% and clean in 8.20%. In the same study, when the floor cleanliness was examined, 26.23% of the enterprises were considered dirty, 63.93% of the enterprises were moderately clean and 9.84% of the enterprises were clean.

According to health parameters, skin condition was evaluated as bad in 12.8%, medium in 21.1% and good in 66.1% of the enterprises. Hoof condition was evaluated as poor in 2.8%, moderate in 24.4% and good in 72.8% of the enterprises. In the evaluations made in the enterprises regarding the significant pathologies in the animals, it was determined that it was very common in 11.7% of the enterprises, moderate in 25.6% and rare in 62.8%. Meşe and Karakuş (2019) evaluated 6.56% of the enterprises as poor, 16.39% as medium and 77.05% as good in terms of skin condition. Martini et al., (2015) evaluated the skin condition of animals in biodynamic, conventional and organic production systems as 7.7, 7.9 and 8.2, respectively. Meşe and Karakuş (2019) evaluated the hoof condition as poor in 1.64%, moderate in 18.03% and good in 80.33% of the enterprises. In addition, it was reported that significant pathologies were very common in 1.64% of the enterprises, moderately

common in 14.75% and rarely seen in 83.61%. Martini et al., (2015) reported 6.3, 7.6 and 8.5 for biodynamic, conventional and organic production systems, respectively.

CONCLUSION

Although animal production is carried out for different purposes, the basis of production is to produce healthy animals and profitable animal production. For this reason, production systems and herd management practices are very important. Biosecurity practices can often be neglected at the point of creating a plan against internal and external threats to livestock enterprises. However, biosecurity in animals is the insurance of herd health and productivity. It is important to have information about the current status and level of biosecurity practices in livestock farms in order to create emergency plans for emerging diseases, as well as to see where improvements need to be made while combating diseases or whether biosecurity needs to be improved. For this reason, activities such as health protection practices, regular health checks and keeping of records, efforts to create a clean enterprise and breeder training are carried out. As animal production practices, disease occurrence and customs differ between countries, it is likely that biosecurity will also differ between countries. Therefore, it is important to investigate biosecurity practices in different regions. Biosecurity practices are also closely related to animal welfare. In terms of animal welfare, practices such as clean, healthy, comfortable shelters, providing adequate temperature, ventilation, lighting, providing sufficient space for animal movements and ease of work are among the effective factors to reduce stress factors that will occur in animals. Increasing the perceptions of breeders, especially on biosecurity and animal welfare with the increase in field studies, training, information and controls will benefit the increase in standards in general.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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