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Evaluation on Biosecurity Practices of Dairy Farms in Bursa Province -II[A]

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Abstract: Biosecurity is focused on reducing, preventing, and minimizing the spread of animal diseases or pests on a farm. Biosecurity action plans need to be considered mainly in farms where disease agents can be carried by various sources such as workforce, consultants, substitute cattle, consumables, feedstuffs, and vehicles. The concept of biological risk management recognizes that animal diseases cannot be completely eliminated, but that producers can manage disease risk through effective control measures. In the study, the farms and districts with 20 heads and above in Bursa province, which are registered in the Türkvet and herd book-program database were determined. The farms in these five districts (Mustafakemalpaşa, Yenişehir, Karacabey, Nilüfer and Osmangazi) are grouped according to their number of animals. The farms are divided into three layers: 20-50 head, 51-100 and >101 head cattle. The farms were determined and the farms within the population size were chosen and visited randomly by stratified sampling method. During the farms' visits, questions were asked to reveal the border security of the farms, animal movements, applications for visitors and the protection of feed and water resources. There is no awareness at this point in the districts, especially in the questioning about animal mobility, especially about the transport vehicles and their drivers. It has been revealed that the necessary care is not taken to clean the vehicles in which the animals will be transported beforehand, that there are no other animals or equipment in the vehicles, or that the vehicle driver does not enter the shelters. Although some farms have generally protective approaches, it has been found that basic biosecurity measures are rarely used and these measures are not applied to all visitors to the same extent.

Keywords: Bursa province, biosecurity practices, dairy farms, survey.

[A] Ethics committee approval was obtained with the decision letter of Bursa Uludağ University Research and Publication Ethics Committee dated 31.01.2022 and numbered 6 of the 2022-01 session. Research and Publication Ethics were followed in this study.

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Bursa İli Süt Sığırcılığı İşletmelerinin Biyogüvenlik Uygulamaları Açısından Değerlendirilmesi-II

Öz: Biyogüvenlik, bir çiftlikte hayvan hastalıklarının veya zararlılarının girişini azaltmaya, önlemeye ve yayılmasını en aza indirmeye odaklanmıştır. Biyogüvenlik eylem planlarının esas olarak, hastalık etkenlerinin işgücü, danışmanlar, ikame sığır, sarf malzemeleri, yem maddeleri ve araçlar gibi çeşitli kaynaklar tarafından taşınabileceği işletmelerde dikkate alınması gerekir. Biyolojik risk yönetimi kavramı, hayvan hastalıklarının tamamen ortadan kaldırılamayacağını, ancak üreticilerinin etkili kontrol önlemleri yoluyla hastalık riskini yönetebildiğini kabul etmektedir. Bu araştırmada Bursa ilinde sığırcılık işletmelerinin biyogüvenlik uygulamalarının mevcut işletmelerdeki durumunun incelenmesi amacıyla yürütülmüştür. Araştırmada Türk- vet ve e- ıslah sistemi veri tabanına kayıtlı Bursa ilindeki 20 baş ve üzeri sığır varlığına sahip olan işletme ve ilçeler belirlenmiştir. Bu tip işletmelerin yoğun olduğu beş ilçedeki (Mustafakemalpaşa, Yenişehir, Karacabey, Nilüfer, Osmangazi) işletmeler hayvan varlıklarına göre gruplandırılmıştır. Bu kapsamda işletmeler 20-50 baş, 51-100 ve >101 baş üzeri sığır varlığına sahip olanlar olmak üzere üç sınıfa ayrılmıştır. Tabakalı örnekleme yöntemine göre örnek büyüklüğü belirlenmiş ve tabaka içerisindeki işletmeler tesadüfi olarak seçilip ziyaret edilmiştir. İşletme ziyaretlerinde sınır güvenliği, hayvan hareketleri, ziyaretçilere yönelik uygulamalar ve yem ve su kaynaklarının korunması konularını ortaya koyacak sorular yöneltilmiştir. Hayvan hareketliliği konusunda özellikle nakil araçları ve sürücüsü ile ilgili yapılan sorgulamada ilçelerde bu noktada bir farkındalık bulunmamaktadır. Hayvanların taşınacağı araçların önceden temizlenmesi, araçlarda başka hayvan veya ekipmanların bulunmaması ya da araç sürücüsünün barınaklar içine girmemesi konusunda gerekli özenin gösterilmediği ortaya çıkmıştır. Bazı çiftliklerin genel anlamda koruyucu yaklaşımlara sahip olmasına rağmen, temel biyogüvenlik önlemlerinin nadiren kullanıldığını ve bu tedbirlerin tüm ziyaretçilere aynı ölçüde uygulanmadığı tespit edilmiştir.

Anahtar Kelimeler: Bursa ili, biyogüvenlik uygulamaları, süt sığırcığı işletmeleri, anket.

Introduction

Biosecurity practices can often be neglected when creating a plan against the threats that may come from inside and outside to livestock Farms. In addition to the economic losses caused by epidemics or pests in the farms, this situation also makes it necessary to follow up the applications that cover a long and troublesome process such as quarantine. However, with simple biosecurity measures to be taken, the prevention of epidemic diseases in the farms, and the transmission of new diseases to animals can be prevented. Disease agents can be transmitted to animals directly or indirectly Direct contamination; While it occurs through saliva, nasal and eye discharge, genital discharge, fetal fluids, feces, urine, milk, or blood, indirect contamination occurs due to contact with any object in the environment or living vectors.

Although protective practices to protect animals against diseases have been used for years, biosafety was first used in the UK during the foot and mouth disease (FMD) epidemic in 2001 (Nerlich and Wright, 2006; Enticott, 2008). The concept of biosecurity can be defined in various ways. While its scope is limited to "management systems that reduce the risk of transmission of infectious diseases to the herd" (external biosecurity), it is expressed as management practices that regulate the contact of animals with each other (internal biosecurity) (Caldow, 2004; Villarroel et al., 2007). At the same time, this approach includes herd management systems that reduce the risk of infectious diseases entering the herd. The benefits of biosecurity practices to prevent or control diseases offer producers significant advantages with increased production efficiency, good animal welfare, and enhanced immune responses. There are many recommendations within the scope of biosecurity in farms to prevent diseases in general or minimize specific infection risks, including zoonotic risks (Brennan and Christley, 2012). In other words, biosecurity is an indispensable tool for the control of infectious diseases. It can be expressed as all the management systems implemented to reduce the risk of infectious disease for a herd. (Cullor, 2004). On the other hand, biosecurity stands out as farm management and routine health protection practices (Anderson, 2010).

Biosecurity in animals is the assurance of the health and productivity of the herd. While the cost of diagnosis and treatment of the disease can be high, it can also create inconveniences in food safety. At this point, it should not forget that preventive practices are important in terms of efficiency and product reliability to minimize the emergence and spread of diseases (Erganiş 2009, Sungur and Çöven 2009). Large-scale farms are generally advised to include various biosecurity practices to prevent disease or minimize specific infection risks, including zoonotic risks. While many of these approaches recommend preventive procedures, no information is often provided about the cost-effectiveness or participation of such practices. Few studies generally focus on a single practice, such as disinfectant footbaths (Amass et al., 2000; Morley et al., 2005) or approaches to prevent only a disease (Ellis-Iversen et al., 2008).

Training and informing the farm owner and personnel about the issue's importance is vital in preventing possible losses. In this context, it will consider that disease risks may arise from newly purchased animals, deficient health-protection practices, or risky environmental conditions. If these risks are known, it will be easier to deal with or overcome problems on the farms level. The main subjects of biosafety training are management of visitors, traffic control, training of employees, management of newly commissioned animals, technical services, storage and transportation of feed, in-farm practices, and manure management. Whether the welfare of farm animals is measured accurately enough with scientific variables is an issue that awaits resolution. Because well-being is relates to people's moral views, its solution is complicated in some cases. The difference in this matter is also prominent in the definition of welfare. While some of the researchers equated welfare with biological fitness (only in cases where the animal's ability to live and reproduce), others defined it as the mental and physical health of the animal, which includes different criteria (Koyuncu and Altınçekiç, 2007).

There is almost no data on the level of biosafety practice in livestock enterprises in Turkey. In particular, the studies to be carried out based on the enterprise by way of sampling in the field are of great importance in defining the problems in production and revealing their solutions. This study, it is aimed to reveal an awareness

of the importance of biosecurity in dairy cattle farms, to what extent biosecurity is known/implemented, taking into account the districts that stand out in terms of dairy cattle presence in Bursa.

Material and Method

As research material, farms with twenty or more cattle in three districts (Mustafakemalpaşa, Yenişehir, Karacabey) and two central districts (Nilüfer, Osmangazi) where dairy cattle breeding is intensely maintained in Bursa province registered in the database of Türkvet and e-Islah system in 2016 taken into consideration. The counties of Mustafakemapaşa, Yenişehir and Karacabey, which were taken into consideration, have approximately 60% of the total number of cattle. Data obtained from face-to-face surveys conducted on a voluntary basis with farm owners regarding biosecurity in selected farms were used. Ethics committee approval was obtained with the decision letter of Bursa Uludağ University Research and Publication Ethics Committee dated 31.01.2022 and numbered 6 of the 2022-01 session.

In this study, the population was divided into homogeneous subgroups in terms of one or more characteristics, and a “stratified sampling method” was used. The farms were first divided into five subgroups according to the districts in which they were located, and secondly, into three layers according to the size of the farms. In the stratification process, paid attention to the fact that each farms belongs to the group (layer) to which it belongs. It has been determined that there are 1603 dairy farms that meet these criteria (Table 1). In the second stage, the districts where such farms are concentrated were determined, and the selection phase the farms in five districts (Mustafakemalpaşa, Yenişehir, Karacabey, Nilüfer, Osmangazi) in accordance with the criteria discussed in terms of transportation and healthy conduct of the work was started. In the third stage, the selected farms were grouped according to the existing animal existence. In this context, farms are divided into three layer as holdings with 20-50 head, 51-100 head, and >101 head cattle. The sample population sizes to represent the farms in these three layer and in five districts were determined by calculating according to the "stratified sampling" method (Sümbüloğlu and Sümbüloğlu, 2002).

A minimum of 150 participants' information was evaluated to ensure that made sufficient observations to meet the estimation of the coefficients for each response in the five districts considered (Table 1). In terms of districts, there were cases where no answer could be given to all the questions asked in the farms visited, and this was reflected in the total number of answers. On the other hand, the participants could choose more than one criterion in the answers given to some of the survey questions.

The questionnaire forms obtained at the end of the research were transferred to the computer using the Google forms program. Some answers were numerically coded and exported to Microsoft Excel to aid analysis. Then, numerical (frequency) and proportional values were calculated for the answers given to each survey question. Finally, tested the effect (relationship) of district and farm sizes on the answers with Chi-square analysis (Minitab, 2014).

Table 1. Number of surveys conducted by districts and farms capacity

Districts	Farms capacity (head)			
	20-50	51-100	>101	Total
Yenişehir	20	12	5	37
Osmangazi	4	2	2	8
Nilüfer	16	6	1	23
M.Kemalpaşa	30	10	7	47
Karacabey	19	5	11	35
Total	89	35	26	150

Results and Discussion

Biosecurity is an important tool in controlling infectious diseases and can be defined as management systems applied to reduce the risk of introducing infectious diseases into the herd (Caldow, 2004). Many studies have investigated the implementation of biosecurity in farms at an international level (Faust, 2001; Delabbio, 2006; Pol and Ruegg, 2007; Brandt et al., 2008). The consensus that emerged in most of these studies is that although there is an awareness of biosecurity, implementing biosecurity measures at the farm level is generally weak. The importance of biosecurity practices to help control contagious diseases at the farm level has started to gain international recognition day by day (More, 2007; Negron et al., 2011).

The evaluation results made for the presence of other animal species in or around the farms evaluated in the study are given in Tables 2 and 3. They were keeping other animal species in the holdings increases depending on the rise in the farm capacity. The likelihood of other herds being around is slightly higher in areas with small farms. Farms should not be kept together with different animal species to create an ideal biosecurity level. A study conducted in Malatya related to this issue determined that 9.9% of the farms had other animals (Köseman and Şeker, 2016). It is stated that this value is 84.8% in Şanlıurfa (Yener et al., 2013). Keeping the herd indoors is the primary way to protect cattle from contagious diseases. In this type of closed herd, no cattle are included from outside, and resident cattle do not come into contact with any animals from other farms.

Table 2. Relationships within the farms themselves or with other species in the environment according to the districts (%)

Answers	Districts				
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir
No different types of animals	51.4	44.7	47.8	0.50	43.2
No dog	8.6	8.5	13.0	0.0	8.1
Rodent control is done regularly	20.0	21.3	17.4	25.0	27.0
Grassland not used	28.6	46.8	39.1	25.0	40.5
No other herds around (500 m)	11.4	10.6	13.0	12.5	18.9
No conditions to associate with other species	14.3	25.5	21.7	25.0	16.2

Contacting other animals such as rodents, cats, and dogs that move freely on the farm can threaten internal and external biosecurity. Rodent control is generally well practiced with poisons and traps. Additionally, breeders have reported that cats move freely around the farm and enter barns to support rodent control. However, cats have been identified as a risk factor for the presence of Salmonella (Evans and Davies, 1996) and Q-fever (Schimmer et al., 2011). The role of dogs in the epidemiology of neosporosis has also been demonstrated (Almeria and Lopez-Gatius, 2013). According to the $\chi 2$ analysis, there was no difference between the districts in terms of the presence of other animal species within or around the farm. Regarding farm sizes, the differences between the responses at the point of no different types of animals, no conditions to associate with other species, and common rodent control were significant ($P<0.05$).

Table 3. Relationships within the farms themselves or with other species in the environment according to the districts (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
No different types of animals	41.6[b]	42.9[b]	69.2[a]	*
No dog	9.0	14.3	0.0	
Rodent control is done regularly	13.5[a]	0.0[b]	0.0[b]	*
Grassland not used	31.5	51.4	46.2	
No other herds around (500 m)	11.2	20.0	11.5	
No conditions to associate with other species	18.0[b]	11.4[b]	38.5[a]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

When the border security of the lands where the farms are established, 80.8% of all farms were safe (Table 4), it has been determined that the attention given to border security in small-scale farms is somewhat low, and the importance given to border security increases as the capacity increases. According to the $\chi 2$ analysis, there was no difference between the districts in terms of the reliability of the land borders and terms of the size of the farms. The fact that the farms is not surrounded means that various pathogens enter the farms and uncontrolled human and animal entry from the outside. For this reason, surrounding farms provide better control. In a study on this subject in Malatya province, the ratio of surrounding dairy farms was determined as 70.5% (Şeker et al., 2017).

Table 4. Farm border security (%)

Criteria		Yes	No	No animals on neighboring lands
Districts	M.Kemalpaşa	89.1	8.7	2.2
	Yenişehir	80.6	13.9	5.6
	Karacabey	73.5	20.6	5.9
	Nilüfer	77.3	22.7	0.0
	Osmangazi	75.0	25.0	0.0
Farms capacity (head)	20-50	72.9	22.4	4.7
	51-100	91.4	8.6	0.0
	>101	92.2	3.8	3.8

To remove the animals that died for any reason in the farms, the approach of burying them outside the farm where they cannot reach the predators constitutes approximately 60% of the responses given (Table 5). The rate of buying this material by local administrations is generally around 30%. It has also been stated that animals that died in such cases were released into nature uncontrolled. This poses a threat to both the environment and farm biosecurity. It has been revealed that the necessary care is not taken to clean the vehicles in which animals will be transported beforehand, not to have animals or equipment purchased from other farms in the vehicles, or to create conditions in which the vehicle driver can move freely within the farms.

Table 5. Animal movements by districts (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
Dead animals are buried out of reach of predators	57.1	68.1	60.9	62.5	51.4	
Help is received from local governments for dead animals	22.9	29.8	30.4	0.0	43.2	
Vehicle cleaning is done before loading for animals for sale	20.0	12.8	21.7	25.0	16.2	
The vehicle that will take the animals to be sold is empty when it arrives at the farm	25.7	23.4	17.4	12.5	32.4	
The vehicle and its driver are not allowed to roam the farm	8.6	17.0	13.0	12.5	13.5	
No shared equipment with other farms	14.3^{b}	29.8^{b}	17.4^{b}	50.0^{a}	10.8^{b}	*

* Values with different superscripts in the same row differ at ($p<0.05$).

The carcasses of animals that died in farms can harm people and other animals. They can contaminate soil, air, and water and require particular disposal. Within the scope of minimizing the pollution and disease spread risk in the farms, carcasses must be destroyed within 48 hours of death, including any contaminated bedding, milk, manure, or feed. In particular, disposal methods should be chosen to prevent predators from reaching these wastes (Hersom, 2015). Dead animals should not be thrown into the forest or in areas where predators can get them. When needed, it should be removed from the farms with the help of local authorities and buried correctly.

While animal movements often consider the spread of disease as the leading cause of visitors and vehicles entering the farm, they are also issues to be considered when establishing a biosecurity strategy on the farm (Alvarez et al., 2011). The risk of disease transmission may vary according to vehicle types. In a study conducted on this subject, only half of the farms planned a feed preparation unit at the entrance of the farm. The feed supplier had to enter the area where the barns are located during unloading in only one-third of the feed while unloading the feed, on the other hand. However, feed and milk collection trucks rarely come into direct contact with animals on a farm, it is stated that these vehicles should be considered as a biosecurity risk since they visit several herds on the same day (Ribbens et al., 2009). Studies have revealed that cattle farms are frequently visited by professional visitors, but visitors' biosecurity measures are badly affected. Nöremark et al. (2013) state that veterinarians, artificial insemination technicians, and sellers directly contact animals. When professional visitors frequently enter the herd and come into direct contact with animals, adequate biosecurity

measures such as location-specific protective clothing and boots or footbath disinfection should be provided (Villarroel et al., 2007; Nöremark et al., 2013). The study observed that these basic biosecurity measures were rarely used, although some of the farms had these measures. In addition, it has been determined that these measures are not applied to all visitors to the same extent. Generally, it has been determined that veterinarians use protective clothing and boots more frequently.

Table 6. Animal movements by districts (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
Dead animals are buried out of reach of predators	60.7	60.0	57.7	
Help is received from local governments for dead animals	22.5^{b}	37.1^{b}	46.2^{a}	*
Vehicle cleaning is done before loading for animals for sale	14.6^{b}	11.4^{b}	34.6^{a}	*
The vehicle that will take the animals comes to the farm empty	19.1^{b}	25.7^{b}	42.3^{a}	*
The vehicle and its driver are not allowed to roam the farm	6.7^{b}	22.9^{a}	23.1^{a}	*
No shared equipment with other farms	10.1^{c}	31.4^{b}	42.3^{a}	*

* Values with different superscripts in the same row differ at ($p<0.05$).

This study is an important problem because vehicles are not cleaned and disinfected infrequently. Similarly, it was reported that manure spreaders visited more than half of the farms in the study area, but their vehicles were sparsely cleaned and disinfected. It should consider that this is very important, especially considering many diseases that can be transmitted through manure (Newell et al., 2011; Strauch and Ballarini, 1994).

While it is pleasing that different materials are prominent in the responses received from the breeders on the subject, those who say that they use materials without the need for cleaning in both activities in 11.4%-26.1% of the farm by districts are alarming (Table 7,8). This rate was determined as 18% in all farms. It is seen that the rate of those who state that the equipment used at the scale of the farm is not cleaned between applications increases as the capacity increases. In the evaluation, the differences between the answers given to the 2nd and 3rd questions except the first question were found to be significant ($P<0.05$).

Equipment contaminated with manure, urine, and other wastes can spread disease organisms between farms by equipment management. Therefore, it is recommended to clean and disinfect borrowed or rented equipment (Defra, 2002). Brennan et al. (2008) state that farmers who borrow equipment must clean and disinfect contaminants before returning it. There was no significant difference in the evaluation of the practices to prevent the contamination of the equipment and feed with manure according to the size of the farms.

Table 7. Evaluation of practices to prevent manure contamination of equipment and feed by districts (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
The same equipment is used in feed and manure works and is not cleaned between uses	11.4	19.1	26.1	25.0	16.2	
When the equipment is cleaned very well, it can be used in both feed and fmanure works	42.9[a]	36.2[a]	26.1[a]	0.0[b]	35.1[a]	*
Equipment used in feed and manure works should be separate and the same equipment should not be used	25.7[b]	34.0[b]	43.5[b]	75.0[a]	40.5[b]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

Table 8. Evaluation of practices to prevent manure contamination of equipment and feed by districts (%)

Answers	Farm capacity (head)		
	20-50	51-100	>101
The same equipment is used in feed and manure works and is not cleaned between uses	15.7	22.9	19.2
When the equipment is cleaned very well, it can be used in both feed and fmanure works	41.6	20.0	26.9
Equipment used in feed and manure works should be separate and the same equipment should not be used	29.2	51.4	46.2

Access of pets, wild animals, and birds to silos and feed preparation units where feed raw materials are stored should be prevented. Feed tanks, silos, and feed distribution vehicles should be cleaned and disinfected regularly. The most common way to contaminate feed or feeding areas is agricultural equipment used for fertilization. Things to consider to reducing this risk can be listed as follows. It should be avoided to operate equipment used in manure transport for feed preparation and transportation activities. If necessary, it should be cleaned before using it to transport feed. For these activities under consideration, common traffic routes should be avoided, feed storage and composting areas should be planned, and barns should be planned and constructed where cattle cannot pass through feed storage and preparation areas. Contaminated forage (feeds, pasture, grains and concentrates, water and waste milk), feeding equipment, and systems should be considered when preparing a biosecurity plan on the farm (Anderson, 2010). The farm environment should be surrounded by wire mesh; the doors should be closed and locked permanently.

Stale or contaminated feed must be disposed of safely, kept away from animals, and protected from pests. To prevent the bait from spreading around by wind or other means (vehicle wheel, clothing, etc.), care should be taken to clean up any feedstuff immediately spilled (Anonymous, 2018b). The results of protecting feedstuff in the farms from birds, cats, dogs, and insects are given in Tables 9 and 10. Considering both the districts and the size of the farms, the most prominent response in the farms is the option "I keep the raw feed materials in a closed area." On the other hand, it is well preserved checked against spoilage and rodents. As the operating capacity grows, care is taken to protect the feedstuffs. Improper feed storage encourages pests and diseases that can contaminate feed or reduce its usefulness. Contaminated feedstuff can harbor disease organisms and pests that can harm farm animals. Care should be taken to keep baits in a clean and dry storage area.

Table 9. Distribution of the protection of feedstuffs in the farms by districts (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
Unprotected against external factors	14.3[c]	14.9[c]	39.1[b]	62.5[a]	16.2[c]	*
Feedstuff are kept in a closed area	65.7	72.3	56.5	25.0	59.5	
Feedstuff are checked for spoilage and rodents	25.7[b]	12.8[b]	4.3[b]	12.5[b]	32.4[a]	*
Silos are cleaned regularly	11.4	17.0	13.0	0.0	13.5	

* Values with different superscripts in the same row differ at ($p<0.05$).

Table 10. Distribution of the protection of feedstuffs in the farms by districts (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
Unprotected against external factors	25.8	14.3	15.4	
Feedstuff are kept in a closed area	66.3	60.0	53.8	
Feedstuff are checked for spoilage and rodents	12.4[c]	31.4[a]	26.9[b]	*
Silos are cleaned regularly	9.0[b]	8.6[b]	34.6[a]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

The inquiry results about the protection of water resources from pathogens are given in Table 11 and 12. The option of using water from a regularly controlled source has the highest value, with a rate of 42.3% in farms with 101 heads or more. The water given to the animals should be clean; unsuitable drinking water can cause big problems. Contaminated water from artesian wells (containing coliform bacteria and E. Coli) causes acute gastroenteritis (Won et al., 2013). Klebsiella spp. causing mastitis and milk loss in farms. It is transmitted orophecally by fecal contamination and drinking contaminated water. (Zadoks et al., 2011). Many pests and diseases can survive in water for a long time until they find another host, so it is important to keep the water clean. According to the $\chi 2$ analysis, there was no difference between the districts in terms of protecting water resources from pathogens. On the other hand, when evaluated regarding farm sizes, the difference in answers to questions 3 and 5 is significant ($P<0.05$).

Table 11. Distribution of protection of water resources from pathogens by districts (%)

Answers	Districts				
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir
It comes from the uncontrollable environment	0.0	0.0	0.0	12.5	16.2
There is a regular water supply and it is under control.	17.1	14.9	17.4	25.0	13.5
It provides fmanure and natural life from a protected source	45.7	46.8	39.1	12.5	37.8
A resource is used that is checked twice a year	2.9	4.3	13.0	25.0	13.5
Uses a regularly checked resource	34.3	27.7	13.0	37.5	18.9

Table 12. Distribution of protection of water resources from pathogens by farms size (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
It comes from the uncontrollable environment	12.4	8.6	3.8	
There is a regular water supply and it is under control.	15.7	14.3	19.2	
It provides fmanure and natural life from a protected source	48.3[a]	37.1[a]	23.1[b]	*
A resource is used that is checked twice a year	5.6	8.6	19.2	
Uses a regularly checked resource	16.9[c]	34.3[b]	42.3[a]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

Especially in areas with high cattle housing, short distances to neighboring herds, and a high frequency of professional visits require breeders to be aware of the various ways disease agents can enter and spread within the herd. According to Nöremark et al. (2010) stated in their study that even breeders with insufficient biosecurity knowledge stated that this was sufficient in their farms. This approach reveals the necessity of informing and guiding the breeders to create an adequate biosecurity strategy, especially for farm visitors (Sarrazin et al., 2014). Another study showed that most breeders are broadly familiar with the concept of biosecurity, but it lacks practical application (Brennan and Christley, 2012). It has been found that the importance given to the cleanliness of the visitors to the farms is over 80% in the farms outside the Nilüfer district (Table 13). It is seen that as the current capacity increases according to the size of the farms, the importance given to the cleanliness of the visitors in the farms increases and even reaches 100% in the farms with 101 cattle or more. According to the $\chi 2$ analysis, the differences between the districts and the size of the farms are significant ($P<0.05$) in terms of checking the cleanliness of the visitors coming to the farm.

Table 13. Checking the cleanliness of the visitors to the farm (%)

Criteria		Yes	No	P
Districts	M.Kemalpaşa[b]	80.0	20.0	
	Yenişehir[b]	87.9	12.1	
	Karacabey[b]	81.3	18.8	*
	Nilüfer[a]	52.2	47.8	
	Osmangazi[b]	87.5	12.5	
Farms capacity (head)	20-50[b]	69.1	30.9	
	51-100[b]	82.4	17.6	*
	>101[a]	100.0	0.0	

* Values with different superscripts in the same column differ at ($p<0.05$).

It is stated that the parking lot of the vehicles of the guests, salespeople, and specialist personnel who come to visit the farms is an area determined at the entrance of the farm with 56.0% of the districts. However, 24.7% of them are allowed to park wherever they want within the farms is quite remarkable in terms of endangering farm biosecurity. In the evaluation made according to the farm capacity, it is notable that the value of parking in the desired place is 33.7% for those who have 20-50 animals (Table 14). However, the decrease of this value to 10%

and below in farms with >101 heads answering the same question is promising in terms of restricting in-farm vehicle mobility, which is one of the main topics of biosecurity. Vehicles have an important place in transporting or spreading disease agents to farms. For this reason, it is important that the entrance to the farms is through a single door and this is controlled. At these entrances, disinfection applications especially for vehicles should be used. The access of people and visitors to the stables should be limited (Anonymous, 2014). The differences between the answers given to all questions among the districts in terms of the parking arrangement of the vehicles of the visitors to the farm and the answers given to the 1st and 3rd questions in terms of the size of the farm are significant (P<0.05).

Table 14. Distribution of car parks of visitors to the farm by districts (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
No restrictions	28.6[a]	12.8[b]	39.1[a]	50.0[a]	21.6[a]	*
A designated area at the main entrance	45.7	70.2	39.1	50.0	59.5	
A designated area at the main entrance (away from shelters, manure and feed haul roads)	14.3	4.3	13.0	0.0	13.5	
	Farm capacity (head)					P
	20-50	51-100	>101			
No restrictions	33.7[a]	14.3[b]	7.7[c]			*
A designated area at the main entrance	49.4	68.6	61.5			
A designated area at the main entrance (away from shelters, manure and feed haul roads)	5.6[b]	8.6[b]	26.9[a]			*

* Values with different superscripts in the same row differ at (p<0.05).

In the inquiry about the visitors' use of the farm entrance, approximately 17% of the districts in general stated that they could use whatever they wanted, even if there were different entrances (Table 15). However, although there are other doors, the entrance from the main entrance or the door defined for visitors is high. In the evaluation made according to the operating capacity, it was determined that as the number of animals in the farm increased, the sensitivity and awareness to the subject increased, and it was preferred that the entrances be made from controlled entrances determined within a certain discipline (Table 16). The differences between the districts in terms of the farm entrances used by the visitors coming to the farm for different purposes and the answers given to the question that all visitors will use a single clearly defined entrance gate in terms of the size of the farm are significant (P<0.05).

Table 15. Evaluation of the farm entrances used by the visitors coming to the farm according to the districts (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
Multiple entries can be used	17.1[a]	6.4[b]	26.1[a]	25.0[a]	21.6[a]	*
Although an entry point is not specified, the main entrance is usually used	25.7	46.8	26.1	25.0	27.0	
Some visitors (medium and high risk) use the main entrance	2.9	2.1	4.3	0.0	0.0	
All visitors use a single defined entrance door	40.0	25.5	30.4	50.0	40.5	

* Values with different superscripts in the same row differ at ($p<0.05$).

In the biosecurity risk analysis of farms, people and workers, relatives of employees, veterinarians, and service personnel who provide services should be considered. First, it should be known for what purpose and frequently the visitors come to the establishment, and regular records should be kept at the point of following the occurrence of any disease depending on these visits. The contact of visitors and their vehicles with the herds in the open or closed environment should be limited. Farm employees and visitors should avoid direct contact with other animals outside their field of duty (Anonymous, 2008).

Table 16. Evaluation of the farm entrances used by the visitors coming to the farm according to the districts (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
Multiple entries can be used	19.1[a]	20.0[a]	3.8[b]	*
Although an entry point is not specified, the main entrance is usually used	37.1	34.3	15.4	
Some visitors (medium and high risk) use the main entrance	2.2	2.9	0.0	
All visitors use a single defined entrance door	24.7[b]	34.3[b]	69.2[a]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

According to the current risk situation about 40.7% stated that visitor entries are not restricted according to the districts (Tables 17 and 18). People can carry diseases pests unintentionally without realizing it. Suppliers, veterinarians, shippers, workers, and visitors are at risk of transmitting disease. To limit the risk of visitors carrying the disease to the farm, there should be only one access point first so that all movements within the farm can be recorded and it can be known who came into contact with the farm (Anonymous, 2018). When there is a risk of disease in neighboring farms, visit entrances should be restricted as the most important precaution and visitors should not be accepted, especially to the farm. The differences between the answers given to the questions in terms of districts and the restriction of visitor entries according to the risk situation are important ($P<0.05$). In terms of farm sizes, the differences between the answers given to the questions other than we have just implemented biosecurity practices, an approach is followed, are significant ($P<0.05$).

Table 17. Distribution of restrictions on visitor entries according to risk status by districts (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
No restrictions	57.1[a]	36.2[a]	52.2[a]	0.0[b]	32.4[a]	*
Biosecurity rules started to be implemented	11.4	4.3	0.0	12.5	16.2	
Current risks are known and access to some sections is blocked	22.9[b]	31.9[b]	21.7[b]	62.5[a]	35.1[b]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

Table 18. Distribution of restriction of visitor entries according to risk status by farms size (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
No restrictions	58.4[a]	22.9[b]	3.8[c]	*
Biosecurity rules started to be implemented	4.5[b]	11.4[b]	19.2[a]	*
Current risks are known and access to some sections is blocked	19.1[b]	48.6[a]	46.2[a]	*

* Values with different superscripts in the same row differ at ($p<0.05$).

Regarding the dress code applied for farm visitors about 32.7% of the breeders stated that the hygiene rules for visitors are involved in their farms (Table 19). According to the size of the farms, overalls, and disinfectants indicate that about 70% of the disposable covers are used in farms with a capacity of >101 heads, and they show the necessary sensitivity in terms of biosecurity (Table 20). It has been observed that about 7.3% of the farms do not allow the vehicles that bring feed and their users to enter the farms. Since the vehicles that bring feed goes from farms to farms, they are the vehicles that best carry pathogens from the previous farms or to the following farms. Keeping these vehicles out of farms as much as possible and high-pressure washing with a broad-spectrum disinfectant in cases where it is mandatory will further reduce the risk of introducing less visible threats such as bacteria, viruses, and spores (Anonymous 2018). Hygiene rules are applied for the visitors in terms of the size of the establishments and the difference between the answers given to the questions except for the questions, they enter the barn directly is significant ($P<0.05$).

Table 19. Distribution of special clothes code for farm visitors by districts (%)

Answers	Districts				
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir
No attention to clothes	17.1	42.6	47.8	50.0	43.2
Hygiene rules apply to visitors	34.3	36.2	17.4	25.0	37.8
Visitors can enter the barn directly	25.7	10.6	8.7	0.0	16.2
Visitors go through a disinfectant foot bath	28.6	31.9	8.7	0.0	24.3
Clean-looking boots and overalls are used	25.7	36.2	21.7	12.5	24.3
Disposable equipment is used	17.1	6.4	4.3	0.0	8.1
Vehicles or drivers are not allowed in the barn.	8.6	0.0	4.3	12.5	16.2

Table 20. Distribution of special clothes code for farm visitors by farms size (%)

Answers	Farm capacity (head)			P
	20-50	51-100	>101	
No attention to clothes	43.8[a]	42.9[a]	11.5[b]	*
Hygiene rules apply to visitors	24.7	42.9	46.2	
Visitors can enter the barn directly	16.9	17.1	3.8	
Visitors go through a disinfectant foot bath	16.9[b]	37.1[a]	30.8[b]	*
Clean-looking boots and overalls are used	19.1[b]	28.6[b]	53.8[a]	*
Disposable equipment is used	2.2[b]	2.9[b]	38.5[a]	*
Vehicles or drivers are not allowed in the barn.	3.4	14.3	11.5	*

* Values with different superscripts in the same row differ at ($p<0.05$).

Table 21. Distribution of measures to protect the herd by districts when breeders visit other farms (%)

Answers	Districts					P
	Karacabey	M.Kemalpaşa	Nilüfer	Osmangazi	Yenişehir	
Changing only boots	20.0	44.7	21.7	25.0	37.8	
Wear clean clothes and boots, avoiding contaminated areas	11.4[b]	8.5[b]	13.0[b]	75.0[a]	18.9[b]	*
It is not allowed to enter the fertile areas and the feed unit, and the boots are disinfected at the exit	25.7	10.6	21.7	0.0	21.6	

* Values with different superscripts in the same row differ at ($p<0.05$).

Indirect links through visitors can play a role in spreading both endemic and exotic diseases. Good biosecurity routines can minimize the risk of such a spread by using clean boots and protective clothing, and cleaning equipment between farms. In parallel, the lack of biosecurity may contribute to the spread of the disease (Anonymous, 2018). When other farms are visited, the results of the evaluation of both the visited and the health of the herd according to the districts and the size of the farms are given in Tables 21 and 22. The differences between the answers given to the second question among the districts are significant ($P<0.05$) in terms of the measures taken or the existing herd when the breeders visit other farms. There was no significant difference according to the size of the farm.

Table 22. Distribution of measures to protect the herd by districts when breeders visit other farms (%)

Answers	Farm capacity (head)		
	20-50	51-100	>101
Changing only boots	38.2	31.4	15.4
Wear clean clothes and boots, avoiding manure-contaminated areas	12.4	22.9	19.2
It is not allowed to enter the fertile areas and the feed unit, and the boots are disinfected at the exit.	12.4	28.6	23.1

Conclusion

Biosecurity practices can often be neglected when creating a plan against threats from inside and outside to farms. This situation necessitates the economic losses caused by epidemics or pests in the farms, as well as the practices that cover a long and laborious process such as quarantine. However, with the simple biosecurity measures to be taken, it is ensured that epidemic diseases are prevented in the farms and those new diseases are not transmitted to animals. In this study, it was tried to reveal the current situation with the questions prepared based on the titles mentioned. The awareness of biosafety practices in the districts where the evaluated farms are located or the responses of the districts to the questions regarding the application differed, so it was seen that each district stood out at different points in terms of the criteria discussed. However, it has been determined that Karacabey, M.Kemalpaşa, and Yenişehir districts are ahead of the other two districts, Osmangazi and Nilüfer, the main factor in this is the experience and farmcapacities of these districts. When the answers to the survey questions are considered in terms of the size of the farms, it has been determined that the awareness of the farm owner about biosecurity increases as the animal presence in the farms visited increases, and they are more open to developments and innovations in the current situation and the future. The main factor here is that the income from the farm is closely related to the investment to be made on the subject or being open to new applications.

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