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Change of Diseases in Semi-Intensively Raised Saanen Goats by Year in İzmir

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ABSTRACT

This study aimed to evaluate the prevalence of important infectious and metabolic diseases in goats kept on a farm from 2019 to 2022, as well as the data acquired from the implementation of prophylactic strategies to mitigate these diseases. The study included animals of various ages and genders from the breeding Saanen herd, which is kept in a private enterprise in Izmir. The most common disease in this herd is toxoplasmosis (20.2%), which is followed by pneumonia (19.1%) and border disease (9.52%). However, following the introduction of appropriate immunization and biosecurity protocols, the pneumonia incidence rate dropped dramatically (to 3.57%) the next year. It has been found that the year that the cat population grows is when toxoplasmosis peaks (2022). Pregnancy toxaemia, a metabolic disease with a modest prevalence (1.06-3.44%) in all years except 2022, is another important concern. Except for the flea problem (5.31%) in 2021, no cases were encountered in other years. Preventive strategies have been observed to have a consistent downward trend in the incidence of pregnancy toxaemia, enteritis, and mastitis throughout time. According to this study, biosecurity, preventative, and protective veterinary care can significantly help to uphold timely and regular medical procedures, reduce expenses, and boost output and milk quality.

İzmir'de Entansif Yetiştirilen Saanen Keçilerinde Yıllara Göre Hastalıkların Değişimi

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ÖZ

Bu çalışmada, 2019-2022 yılları arasında bir çiftlikte yetiştirilen keçilerde saptanan önemli enfektif ve metabolik hastalıkların dağılımı ile bunlara karşı uygulanan koruyucu tedbirler sonucunda elde edilen verilerin değerlendirilmesi amaçlanmıştır. Çalışmanın materyalini, İzmir'de özel bir işletmede bulunan, farklı yaş ve cinsiyetteki damızlık Saanen sürüsü oluşturmuştur. Bu sürüde en yaygın görülen hastalık toksoplazmoz (%20,2) olup, bunu pnömoni (%19,1) ve sınır hastalığı (%9,52) takip etmektedir. Aşılama ve biyogüvenlik protokollerinin uygulamaya konmasının ardından, pnömoni görülme oranı bir sonraki yıl önemli ölçüde (%3,57'ye) düşmüştür. Kedi popülasyonunun arttığı yılın toksoplazmozun zirve yaptığı yıl (2022) olduğu tespit edilmiştir. 2022 hariç tüm yıllarda orta düzeyde bir prevalansa sahip (%1,06-3,44) bir metabolik hastalık olan gebelik toksemisi de bir diğer

önemli sorundur. 2021 yılındaki pire sorunu (%5,31) dışında diğer yıllarda herhangi bir vakaya rastlanmamıştır. Uygulanan koruyucu tedbirler doğrultusunda gebelik toksemisi, enteritis ve mastitisin yıllar içinde görülme oranının giderek azaldığı gözlenmiştir. Bu çalışma ile; biyogüvenlik, koruyucu ve önleyici veterinerlik hizmetlerinin hekimlik uygulamalarının düzenli ve zamanında sürdürülmesine, maliyetlerin en aza indirilmesine, üretkenliğin ve süt kalitesinin artmasına önemli katkı sağlayabileceği düşünülmektedir.

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1. Introduction

In poorly managed goat herds, infective diseases such as Caprine Arthritis Encephalitis (CAE), Ecthyma, Akabane, Enterotoxemia, Pseudotuberculosis, Paratuberculosis, Brucella, Leptospirosis, Pasteurella, Contagious caprine pleuropneumonia, Q fever and cestode, trematode nematode invasions, fleas, lice, scabies, ticks, arthropod infestations such as these can be seen very commonly (Senturk, 2012; Reddy et al., 2014). A significant issue for the farm is the occurrences of pneumonia and diarrhoea in kids that result in death and serious infection (Gupta et al., 2023). *Escherichia coli*, Rotavirus, Coronavirus, and other *Cryptosporidium* species have been implicated as the cause of diarrheal diseases in neonates (Senturk, 2017).

Because they result in large financial losses, diseases that affect small ruminants and cause lifelong respiratory issues, weakness, mastitis, abortion, morbidity, and mortality have garnered international attention (Annen et al., 2004; Akkaya et al., 2020). Farm animal herd health is desirable because it ensures the animals' survival and intended purpose. Companies' profitability will also rise if they reach the targeted efficiency level (Leitner et al., 2004; Gökdai et al., 2020).

This study aims to examine the distribution of significant metabolic and infective diseases diagnosed in goats on the farm between 2019 and 2022 and the data gathered due to the preventative measures implemented against them.

2. Material and Method

2.1. Material

The research material includes Saanen goats of different ages and genders from a private farm in Izmir. Since the study utilized the health-protection records of Saanen goats on a farm, an ethics committee document was not required. The company is situated in the Menemen district of Izmir province. The company employs a semi-intensive production approach and has a 200-head capacity. However, an average of 100 animals were studied (Table 1). Births happen once a year, whilst matings take place at the group level. The natural rearing method is used to raise goats, and after an average of 60 days, they are weaned. The weaned kids are given the enterprise's feed resources and some concentrated feed until the fourth month, which is the marketing age, and are sold alive at that point if there is a demand. Depending on the weather, goats are fed a pasture-based diet from 10:00 am to 17:00 in the winter and are given night grazing in the spring and summer Milking is a manual process.

Regular disease vaccinations and internal and exterior parasite management are conducted by a private veterinarian and the District Directorate of Agriculture.

Table 1. Distribution of animals in the farm by years

Years	n	Female	Male
2019	110	76	34
2020	90	72	18
2021	94	72	22
2022	84	73	11

In 2019, 2020, and 2021, the herd was introduced into the buck, but, artificial insemination was applied in 2022. The animals that returned from artificial insemination were injected with the buck.

2.2. Animal Nutrition

All milking goats were given 0.8 kg of pellet feed, 2.0 kg of corn silage, 0.2 kg of wheat straw and 0.6 kg of dry alfalfa hay as a ration. In raising offspring, the dam was with her for the first 3 days and was fed with formula for the next two months. Grazing: It was done every day, twice a day, for 2 hours. During milking, the animals were fed individually according to their milk yield.

2.3. Disease Management and Health-Protection Practices

Sick animals in the enterprise were detected and grouped according to the affected system for diseases in 2019, 2020, 2021, and 2022. A thorough anamnesis and standard clinical examination led to the clinical diagnosis of the afflicted animals. Samples of tissue were obtained from animals that had enteritis and died. In cases of toxoplasmosis, the animals were promptly isolated from the herd to stop the animals' vaginal discharge from spreading to the herd and the toxoplasma agent was found in the blood samples obtained. To evaluate border disease (BDV) antigens, rapid test kits, blood serological test analysis and histopathological staining of the brain and cerebellum were performed on kids with convulsions and dam who had stillbirth/sick birth. After Border Disease, the Bovine Viral Diarrhoea (BVD) vaccine (Hiprabovis®) was administered to the herd once at half dose, and the same vaccine was repeated to the entire herd the following year. Immunochromatographic rapid field test kits (Antigen Rapid, BoviD-4 Ag test Kit, Bionote Inc, Korea) were used to detect *Cryptosporidium*, Rotavirus, Coronavirus, and *E. coli* K 99 antigens for the etiologic diagnosis of neonatal diarrhoea in goats. The herd received a yearly booster shot of the *E. coli* and *Clostridium perfringens type C* (VBR K-99+C®) vaccination to prevent diarrhoea from enteritis and enterotoxemia. Goats with pregnant toxaemia had their blood serum tested to detect the Betahydroxybutyric acid (BHB) values. BHB levels detected (STAT Site® M Spotted with Stanbio, EKF Diagnostics Company, Texas, USA).

In pneumonia cases in the 0-6 month age group, vaccination was not administered because *Pasteurella pneumonia* was not detected in the first years. However, after the disease was detected for the first

time in 2021, regarding the care, feeding and vaccination of the entire herd for protection purposes; those showing clinical signs were removed from the herd and placed in individual pens. Hay, alfalfa hay, and kid growth feed were provided to them along with clean water. Care was taken to ensure that the roughage did not contain large pieces with sharp edges. As vaccination, 2 doses of Pastomix® vaccine were applied to the whole herd, at 3-week intervals, and in the following years, the same vaccine was repeated to the entire herd, once a year. When mastitis cases were seen in 2019, the California Mastitis Test (CMT) solution was used for diagnosis. In addition, the milk samples were screened for agents and *Staphylococci* and *Streptococci* were detected. As vaccination, the Vimco® vaccine was administered to all dairy goats every year, in 2 doses, at 3-week intervals during the middle period of pregnancy. Histopathological evaluation was made with a sample taken from breast tissue in gangrenous mastitis. Vaccinations applied to the herd in question throughout the year: Enterotoxemia, Foot and Mouth, Pasteurella, Plague, Smallpox, Brucella, Contagious caprine pleuropneumonia, Pseudotuberkylosis, Agalaxia, Mastitis, *E.Coli-Cl.perfringens* vaccine. Although the vaccine was administered throughout the year, these vaccinations were repeated for the entire herd if the disease was observed. Goat diseases, signs and symptoms, precautions to take, etc. each animal's process was documented separately from 2019 to 2022. Since data were recorded with the number of sick animals, recurrent diseases were reported as the number of incidents in the study. Control of parasites, both internal and external, was also done. The farm doesn't have a footbathing, but the herd doesn't have any foot issues.

2.4. Statistical Analysis

This study is a scenario assessment based on the health protection records of Saanen goats raised in the faculty practice unit between 2019 and 2022. This led to only a cursory evaluation of the farm's animal health. Using SPSS 22, a frequency table of illnesses that surfaced during the process was created. The data were briefly presented in a table without accounting for the main factors, such as age, birth type, and year.

3. Results

The diseases seen in the herd between 2019 and 2022 are grouped under two headings: infective and metabolic and summarized in Table 2. While only the case of Pregnancy Toxaemia is seen among metabolic diseases, infective diseases are discussed under four subheadings (bacterial, viral, protozoal and parasitic).

Table 2. Diseases observed in the herd

Infective Diseases	Metabolic Diseases
Bacterial factors*:** -Pasteurella pneumonia, -*E.coli* enteritis, -Mastitis, -Gangrenous mastitis, -Enterotoxemia ***Viral factors: -*Rota-corona* enteritis, -Border disease ***Protozoal factors:*** -Cryptosporidiosis, -Coccidiosis, -Toxoplasmosis, ***Parasitic factors:*** -Scabies-flea infestation	-Pregnancy toxaemia and/or ketosis

The frequency values of the diseases observed in goats on the farm in the study are given in Table 3. As seen in Table 3, protozoal diseases (48%) and bacterial diseases (28.4%) were seen more in the herd than other diseases. Metabolic diseases were detected the least in the herd (5.9%).

Table 3. Frequency table of diseased animals in the farm according to groups

	Status	**n**	**%**
Bacterial diseases	Non-disease	73	71.6
	Disease	29	28.4
	Total	**102**	**100.0**
		n	%
Viral diseases	Non-disease	94	92.2
	Disease	8	7.8
	Total	**102**	**100.0**
		n	%
Protozoal disease	Non-disease	53	52.0
	Disease	49	48.0
	Total	**102**	**100.0**
		n	%
Metabolic diseases	Non-disease	96	94.1
	Disease	6	5.9
	Total	**102**	**100.0**

In the study, respiratory, digestive, nervous system, etc. The incidence rate of diseases in the herd (%) is given in Table 4. The rate of respiratory system diseases varies between 1.11% and 19.1% over the years, and the most was detected in 2021 (19.1%). Digestive diseases were seen at least in 2022, with 2.3%. Nervous system diseases were determined with a rate of 9.52% only in 2022. In other years, there is no disease. Mastitis and gangrenous mastitis cases are respectively, It was determined at a rate of 5.73% (2019) and 2.22% (2020). Pregnancy toxaemia is seen in all years, and this rate varies between 1.06% and 3.44%. It is noteworthy that the incidence of toxoplasmosis and scabies will have the highest value in 2022 at 20.2%.

Table 4. Number of cases observed by year and the ratio of the number of affected animals to the whole herd (%)

Diseases	Incidence rate in 2019 (%)	Incidence rate in 2020 (%)	Incidence rate in 2021 (%)	Incidence rate in 2022 (%)
Respiratory system diseases	1.14	1.11	19.1	3.57
Digestive system diseases	8.02	6.63	6.36	-
Nervous system disease	-	-	-	9.52
Mastitis, gangrenous mastitis	5.73	2.22	-	-
Genital system disease	-	-	3.2	20.2
Pregnancy toxaemia	3.44	2.22	1.06	-

The distribution of diseases by year and age is given in Table 5. While pneumonia, *E. Coli* enteritis and Mastitis were observed in animals of different ages in 2019 and 2020, viral diarrhoea was not observed in 2019. 8 Border disease cases in 2022 attract attention. A similar situation applies to Toxoplasmosis disease (4 cases in 2021; 17 cases in 2022). Except for 2021, there haven't been many flea or scabies issues on the farms. In every year, coccidiosis has been a significant issue.

Table 5. Distribution of diseases by year and age

Disease	Age Range	Year 2019 (n:110)	Year 2020 (n:90)	Year 2021 (n: 94)	Year 2022 (n: 84)
Pneumonia	0-6-month-old kids	1	1	18	3
E. Coli enteritis	0-2-month-old kids	1	-	1	-
Mastitis	Milking goat in 3rd-4th lact.	2	1	-	-
Gangrenous Mastitis	4-5. lactating dairy goat	3	1	-	-
Viral diarrhea (route-corona)	0-1 month-old kids	-	1	2	-
Border disease	Pregnant goats, newborn kids	-	-	-	8
Toxoplasmosis	Pregnant goats, newborn kids	-	-	4	17
Cryptosporidium	0-1 month-old kids	4	3	1	-
Coccidiosis	0-3 month-old kids	2	2	2	-
Scabies/fleas	0-6-month-old kids	-	-	5	-
Pregnancy toxaemia	3-4. lactating goats (pregnant triplets)	3	2	1	-

4. Discussion

Infective and metabolic diseases are common in goats and cause significant economic losses (Valadan et al., 2014). *Pasteurella Pneumonia* is one of the diseases commonly observed all over the world

(Kasap et al., 2018). It was also observed intensively in this herd in 2021. After this disease was seen at a rate of 19.1%, it was taken under control with a regular vaccination program, and by 2022, the incidence of the disease was observed to decrease to 3.57% (Table 4). Since Border Disease, which is an important viral agent in sheep and goats all over the world, does not have a known vaccine or treatment, the incidence of the disease has decreased significantly after the Bovine Viral Diarrhoea (Hiprabovis®) vaccination was administered to the entire herd for protection in the year it was observed in the herd (Table 5) (Akkaya et al., 2022). The scarcity of mastitis cases on the farm in recent years has attracted attention (Table 5). This shows that vaccinations for mastitis are beneficial (Leitner et al., 2004; Yesilmen et al., 2017).

Because ruminants have the lowest levels of immunoglobulin transfer during pregnancy, their offspring are hypogammaglobulinemic at birth, meaning they lack an adequate immune system to defend them against infectious pathogens (Batmaz, 2015). After birth, kids should consume five to six percent of their body weight in colostrum. High-quality colostrum should be yellow-cream and have a dense, sticky consistency (Kasap et al., 2018). Rotavirus, coronavirus and *E. coli* are the most common infections that cause diarrhoea in newborn goats. Goats immunized against these bacteria during the dry period will generate colostrum that is high in antibodies (Senturk, 2012). Furthermore, vaccinations against several diseases, Pasteurellosis, and *Clostridium spp*. can produce high immunoglobulin concentrations in colostrum, allowing young goats to survive the neonatal period and even the first three weeks of life. It was found that the herd in question had virtually no cases of rota-corona diarrhoea or *E. Coli* enteritis (Table 5). This is believed to be caused by the regular injections of enterotoxemia (VBR Colimix 9®) and *E. coli-Clostridium* (VBR K-99®) vaccinations during the goats' pregnancies (Akkaya et al., 2021). Focusing on nutrition during the dry phase can enhance the quality of colostrum, raise its antibody content, and benefit the dam’s health. It has been shown that vaccinations given to all pregnant animals in the last months of pregnancy increase the quality of colostrum (Sentürk, 2017). Additionally, the importance of care and maintenance conditions was emphasized. While *Cryptosporidium* cases were observed at a rate of 4.59% in 2019, it was determined that this disease was not observed at all in 2022. (Table 5). For Cryptosporidiosis and Coccidiosis; like other researchers, the shelter was disinfected by paying attention to hygiene conditions (Ruiz et al., 2012, Paul et al., 2014). The key to effective management of toxoplasmosis is rapid and accurate diagnosis of the disease (Liu et al., 2015). The year in which Toxoplasmosis disease, which progresses with abortion, is most common is 2022, and it is thought that the disease is due to the increase in the cat population on the farm (Awais, 2014). Until that year, the number of cats was normal, but the cat population suddenly increased due to both foreign cats being released near the area and multiple births of cats. By neutering the cats and removing them from that area, a possible cat population was prevented, and the positive animals were excluded from the herd and, the disease was taken under control. To prevent pregnancy toxaemia in goats, it is important to carry out proper feeding, care and nutrition (Kasap et al., 2018). It was determined that the pregnancy toxaemia

observed in the enterprise in 2019 decreased or even did not occur at all by 2022 (Table 4). It is thought that Pregnancy Toxemia can be prevented with proper care and nutrition in twin and triple pregnancies (Simpson et al., 2019). In conclusion, there has been a significant decrease in the disease distribution of animals over the years. Care, food, cleanliness, and prompt immunization against associated diseases are the main causes of these declines.

5. Conclusion

Reduced average milk production and higher veterinary and medical expenses are the outcomes of a herd disease. The animal might eventually be taken out of the herd as a result of this, which would lower revenue. Stated differently, the expenses incurred by the herd to maintain animal health are far less than those associated with medication and medical care. Maintaining therapeutic and preventive veterinarian care on a regular and timely basis can significantly reduce expenses while boosting output and milk quality. Animals that test positive for diseases such as toxoplasmosis and border disease, for which there is currently no vaccination, can be removed from the herd and, selection can be made.

Conflict of Interest Statement

The authors and contributors of the article affirm that we have no conflicts of interest.

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