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Possibilities of Evaluation of Silage in Karacabey District, Bursa City

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Abstract: In this study, it was aimed to provide information about silage types, silage usage, feeding method of silage to dairy cows and solutions by organizing a survey in Karacabey district of Bursa city. A survey was applied to a total of 60 daiy cow breeders, including large, medium, and small-scale enterprises.
When asked "which type of silo do you use?", 82% of the animal enterprises declared that they use bulk-type silage, while 10% declared that they use bank-type silage and 8% declared that they use bale-type silage. When the the animal enterprises were asked what they use as a silage additive, 70% of the breeders stated that they did not use additives in silage making, while 20% stated that they used bacterial inoculants plus enzymes in silage making, and %5 stated that they used yeast and the rest stated that they used enzymes. When the breeders were asked about the method of feeding the silage to dairy cows, 73.0% reported that they gave silage to their cows mixed with roughage and concentrate feed, 25.0% reported that they gave silage to their cows mixed silage with dry roughage and 2.0% reported that they gave only silage to their cows. As a result, it is seen that most of the breeders are dependent on maize for silage production and prefer the bulk-type silage. On the other hand, it has been determined that basic information about silage production and animal nutrition of small-scale livestock enterprises is insufficient.
In this context, it can be recommented the small-scale enterprises to participate in training of organization which will increase their knowledges on subjects such as silage making and animal feeding. It may be suggested that they use other forage crops (food pulp residues and heat-resistant fodder crops) as a source of silage, and can also be fed the their animals daily by using a large bank type silage collectively.

Keywords: Survey, silage, Karacabey, dairy cow breeders

Bursa İli Karacabey İlçesinde Silaj Dğerlendirilme Olanakları

Öz: Bu çalışmada, Bursa'nın Karacabey ilçesinde anket çalışması düzenlenerek, silaj tipleri, silaj kullanımı, silajın süt ineklerine yemleme yöntemi ve çözüm yolları konusunda bilgi verilmesi amaçlanmıştır. Büyük, orta ve küçük ölçekli işletme olmak üzere toplam 60 süt ineği yetiştiricisine anket uygulanmıştır.
Sonuç, "ne tip silo kullanıyorsunuz?" sorusuna hayvan yetiştiricilerin %82'si yığın tipi silaj kullandıklarını beyan ederken, %10'u bank tipi silaj ve %8'i de balya tipi silaj kullandıklarını beyan etmişlerdir. "Yetiştiricilere silaj katkı maddesi olarak ne kullanıyorsunuz?" sorusuna, yetiştiricilerin %70'i katkı maddesi kullanmadıklarını ifade ederken, %20'si silaj yapımında bakteriyel inokulant artı enzim kullandıklarını %5'i maya ve geri kalanı ise enzim kullandıklarını bildirmişlerdir. Yetiştiricilere silajın süt ineklerine veriliş şekli sorulduğunda %73'ü ineklerine silajı kaba ve yoğun yemle karışık olarak verdiklerini, %25'i ineklerine silajı kuru kaba yemle karıştırarak verdiklerini %2'si ise silajı ineklerine tek başına verdiklerini bildirmişlerdir. Yetiştiricilerin büyük bir kısmı silaj yapımında mısıra bağımlı oldukları ve yığın tipi silajı tercih ettikleri görülmektedir. Diğer yandan küçük ölçekli hayvancılık işletmelerin silaj üretimi ve hayvan besleme ile ilgili temel bilgilerin yetersiz olduğu tespit edilmiştir.
Bu kapsamda, küçük ölçekli işletmelere silaj yapımı ve hayvan beslemeye yönelik deneyim ve bilgilerini artıracak tarımsal eğitim faaliyetlerin düzenlenmesi, silaj yem kaynağı olarak (gıda posası artıkları ve sıcağa dayanıklı) diğer yem bitkilerine yönelmeleri, kooperatif aracılığıyla büyük ölçekli silo yapılarak günlük silaj almaları önerilebilir.

Anahtar Kelimeler: Anket çalışması, Karacabey, silaj, süt işletmesi

1. Introduction

The most widely used plant in silage in the world is corn. In 2020/21, 196,982 areas (thousand ha) were allocated to corn production, and corn production is over 1.1 billion tons (1,143,555) and feed production is 725 million tons. Biofuel and other industrial uses also affect demand. As in previous years, the most important countries in corn production and cultivation in 2020/2021 are the USA, China, and Brazil (Anonymous, 2021). The export price of corn is 207.4 ($/ton) for food and agriculture organization of the United Nations (FAO) in 2021. As of 2019, 6.5 million tons of corn was used in feed production in Turkey. Karacabey is a district of Bursa, in the Southern

Marmara part of the Marmara Region. There are 98.454.605 decares of pasture area in the district, and the pastures are in the 3rd class position. Considering the presence of animals in the district, both the pasture area and forage crops are not sufficient for the roughage requirements of the animals. According to Turkish Statistical Institute (TUIK) data for 2020, Karacabey district; with 268 thousand 500 tons of silage corn production on 44 thousand decares of land, meets 22.30% of Bursa and 1% of our country. The starch content of corn grain is high compared to other grains. This is a sought-after feature in terms of silage fermentation (Mooi, 1991). Corn is preferred in dairy and fattening enterprises because it is a delicious, nutritious feed with energy value for ruminants as a silage feed source (FAO, 2013). The silage has a great potential in terms of meeting the vital needs of farm animal.

Economically, silage is cheaper than other feeds, with lower warehouse costs (Özhan, 2010) and labor requirements (Şahin & Zaman, 2010). On the other hand, in terms of the continuity of animal production, to increase the yield per animal and reduce the cost, it has great importance that the roughage given to the animal is of high quality and cheap (Yaylak & Alçiçek, 2003; Yıldırım, 2015). Paksoy & Ortasöz, (2018) The researcher states that the farmers prefer corn farming because of the state support and mechanization convenience. In Demir & Elmalı (2016) survey study, it was determined that one of the reasons why business owners use silage is the increase in the milk they provide from dairy cows. On the other hand, if the silage is contaminated with rot, mold, bad smell, or soil residues; it should not be fed to animals (FAO, 2022). When corn silage is also used in high amounts in the rations of ruminant animals, a decrease in milk fat can cause abomasum displacement, diarrhea, and acidosis. (Queiroz et al., 2018; Değirmencioğlu, 2020). In Çekiç (2017) survey study in Malkara district, he states that farmers use heap-type silos for silage production, they do not use additives, and they prefer corn for silage production, but farmers have difficulty in preparing a balanced ration with silage. In Akay & Dağdemir (2009) and Denli et al. (2014) studies, they stated that the producers experienced nutrient losses in the silage and were insufficient in feeding the animals.

With the increase in the number of animals in the future, the shortage of silage and other forage crops is expected to increase in Karacabey. In this study, it was aimed to provide information about silage types, silage usage, feeding method of silage to dairy cows, and solutions by organizing a survey in Karacabey district of Bursa city.

2. Material and Method

A survey was applied to a total of 60 daiy cow breeders, including large, medium, and small-scale enterprises in Karacabey district of Bursa province. In the research; the education level of dairy cow breeders, how many years they made silage, where they learned how to make silage, what type of silage they used, the feed they used in silage making, how much silage they gave to the animals per day and their thoughts on silage delivery times were evaluated. Questions answered (multiple choice, ordering according to the importance and yes or no) was used to determine the knowledge and thoughts of the breeders.

3. Research Findings and Discussion

As seen in Figure 1, 55% of the breeders attributed silage to being cheap as the reason for choosing it, 32% to increasing milk yield, 10% no response and 3% to consuming animals fondly. The rate of 32% participating in the survey partially parallels the positive effect of Demir & Elmalı (2016) on milk yield as the reason why farmers prefer silage.

When asked which type of silo you use, 82% of the animal enterprises declared that they use bulk-type silage, while 10% declared that they use bank-type silage and 8% that they use bale-type silage (Figure 2). Animal breeders in Karacabey prefer bulk-type silage for economic reasons. The fermentation losses in such silage are higher than the fermentation losses in all other silage types. The result obtained regarding the use of bulk type silage in Karacabey district is similar to the survey findings conducted in different regions of Turkey (Yıldız et al., 2008; Şahin & Zaman, 2010; Pınar & Dilek, 2016; Değirmencioğlu, 2016; Çekiç, 2017). Bench-type silage used by 10% of the respondents are the most suitable silage type to be used in Karacabey in terms of silage quality.

When asked what they use as plant material in silage making, 61% of the animal enterprises stated that they use corn as plant in silage making, while 32% stated that they use a mixture of grain and corn as plant, and the remaining 7% declared that they use a mixture of corn and legumes (Figüre 3). The usage of corn as a plant source in silage making is similar to the survey findings of (Değirmencioğlu, 2016;Çekiç, 2017). On the contrary, (Özdemir & Okumuş, 2021) state in their studies that corn, alfalfa and vetch varieties are used as plant in silage in Turkey.

According to the results of the 93% who participated in the survey, it is understood that other green fodder sources are not used sufficiently in silage production. It can be said that this situation is due to the fact that the studies on the silage usage in animal nutrition have not been transferred to farmers and remain at a limited level. The researcher stated that corn and some legume forage crops are grown together, and the silage made is higher

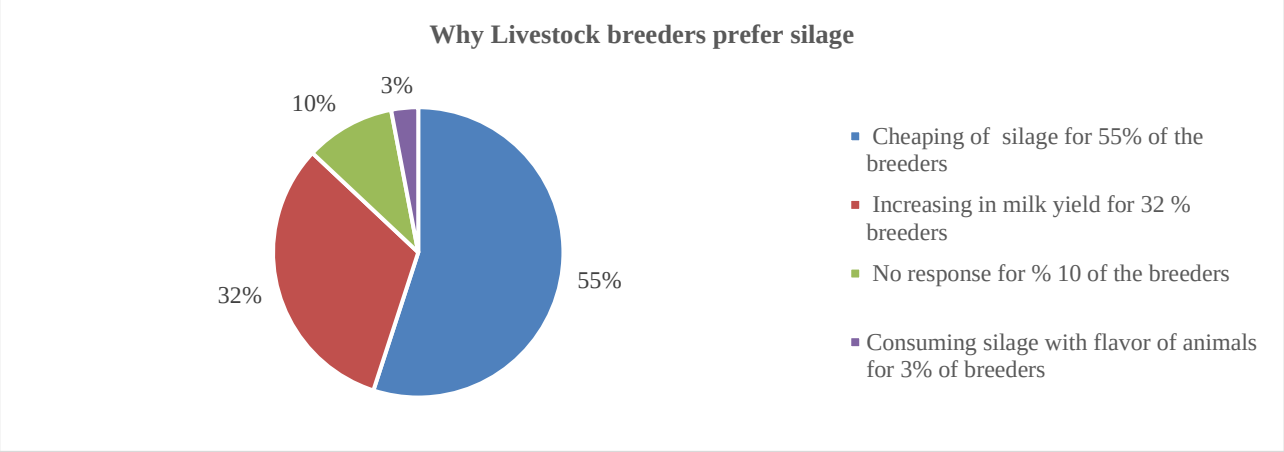

Figure 1. Why do you prefer silage?
Şekil 1. Silajı neden tercih ediyorsunuz ?

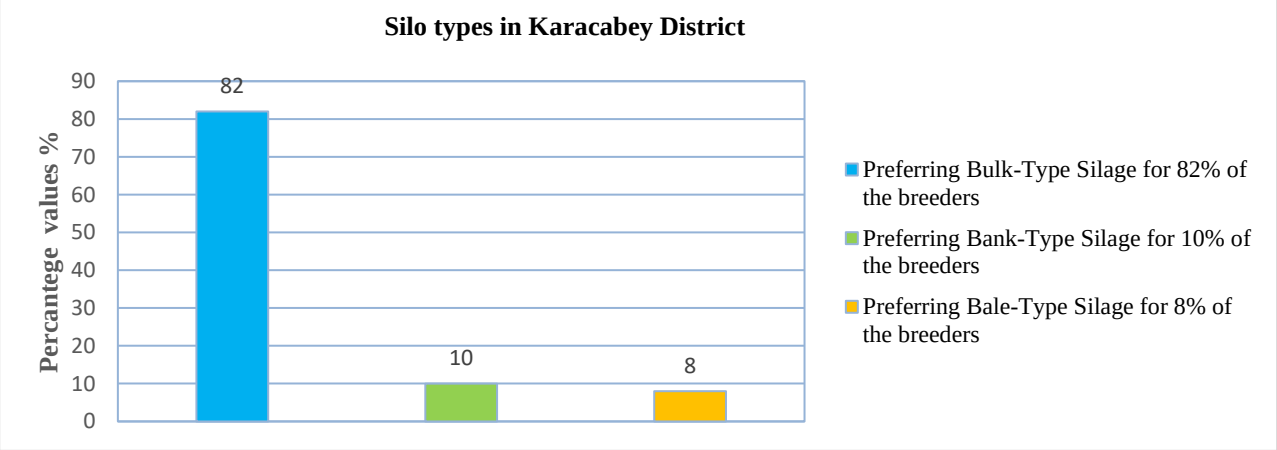

Figure 2. Which type of silo do you use in Karacabey?
Şekil *2.* Karacabey de hangi tip silo kullanıyorsunuz ?

in Dry Matter (DM) than corn silage and there is an increase in the crude prote rate (Kızılşimşek et al., 2020). There are many tomato processing factories in the Karacabey district. Tomatoes are mainly processed in the food industry and the rest (3.5-5%) is used in animal nutrition (Çapçı et al., 1995; Ergen, 1991). Karabulut et al. (1999) investigated the feed value of tomato pulp silage, which has undergone different physical (Un crushed and crushed) and chemical processes (NaOH %2.5 and Urea %3.5), and the possibilities of usage it in lamb fattening. As a result of that research, it was determined that processing the tomato pulp (Urea %3.5) had a positive effect on the feed value. Researchers have obtained similar results on body weight and body weight gain between groups. In another study, researchers fed cows in the 1st group (survival share needs + 10 kg milk yield requirements) with tomato pulp silage and molasses, and the other group with vetch-dried hay. The remaining yield share needs of the groups were met with milk feed. As a result of the research, it was determined that tomato pulp had a positive effect on dairy cows and reduced the cost of milk (Erdinc et al., 1992). Therefore, limited feed resources can increase areas if businesses are encouraged to turn to food pulp residues as plant silage material, both through incentives and demonstrations.

Silage quality is determined by the appropriate material to be selected and the correct silage applications. The additive helps to improve the ambient conditions where the silage material is in the silo. This improvement can be stated as creating an acidic environment in the silo, accelerating LAB development,

improving aerobic stability, reducing hygienic risks, increasing the feed value, and increasing the digestibility of the feed. (Karabulut, 1995). When the the animal enterprises were asked what they use as a silage additive, 70% of the breeders stated that they did not use additives in silage making, while 20% stated that they used bacterial inoculants plus enzymes as a silage additive, and %5 stated that they used yeast and the rest stated that they used enzymes (Figure 4). 70% of the breeders who participated in the survey stated that they do not use additives in silage making. These findings are also consistent with the reports of other researchers Değirmencioğlu, 2016; Çekiç, 2017). It can be said that this situation arises from the economic, educational, and preference differences in the regional structure. According to the results of the survey, it is understood that natural additives are not used enough in silage making.

In the studies have been found positive results on the silage quality of natural additives substances. Research stated that the essential oil (60 mg cinnamon + 60 mg flaxseed + 60 mg lemon seed essential oils/kg) additives increas the aerobic stability of the silage, can improves the quality and nutritive value of silage (Besharati et al., 2020). Thus, the usage of natural silage additives in farms throughout Turkiye should be encouraged, as they do not leave residues in animal products and do not pollute the nature.

As can be seen in Figure 5, 35% of the breeders stated that they did not use carbohydrate source in silage making, While 29% stated that they used wheat craker in silage making, 20% stated that they used molasses, 11% stated that they used barley crushed, and the remaining 5% said that they used concentrate feed in silage making (Figure 5). The usage of molasses and other carbohydrate sources in silage making was found to be compatible with the reports of (Özdemir & Okumuş 2001). Researchers added molasses as an additive to the silage of the lenox plant and determined that molasses improved the odor and DM ratio Gümüş et al. (2020).

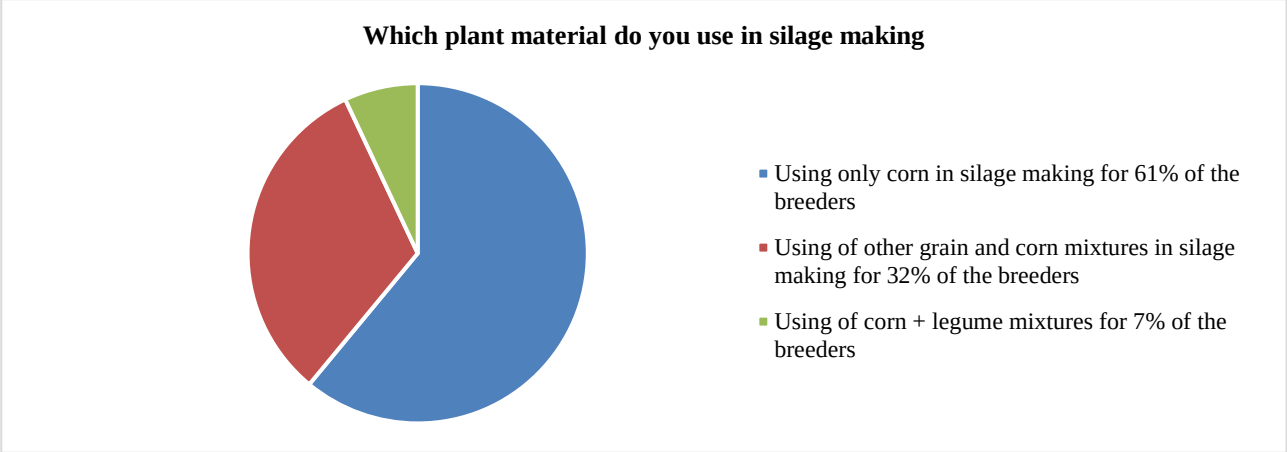

Figure 3. What do you use as plant material in silage making?
Şekil 3. Silaj yapımında bitkisel materyal olarak ne kullanıyorsunuz?

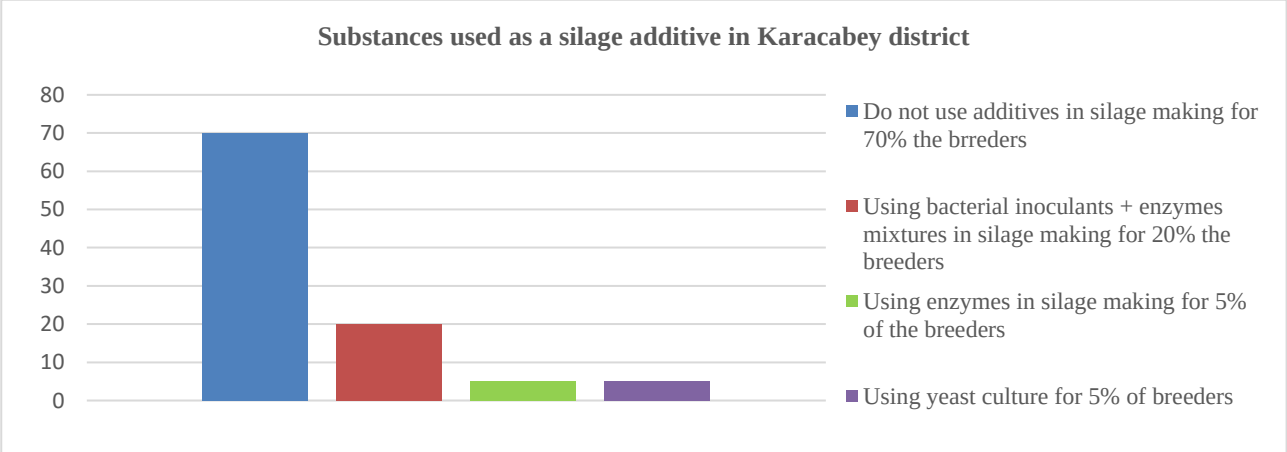

Figure 4. What do you use as a silage additive?
Şekil 4. Silaj katkı maddesi olarak ne kullanıyorsunuz?

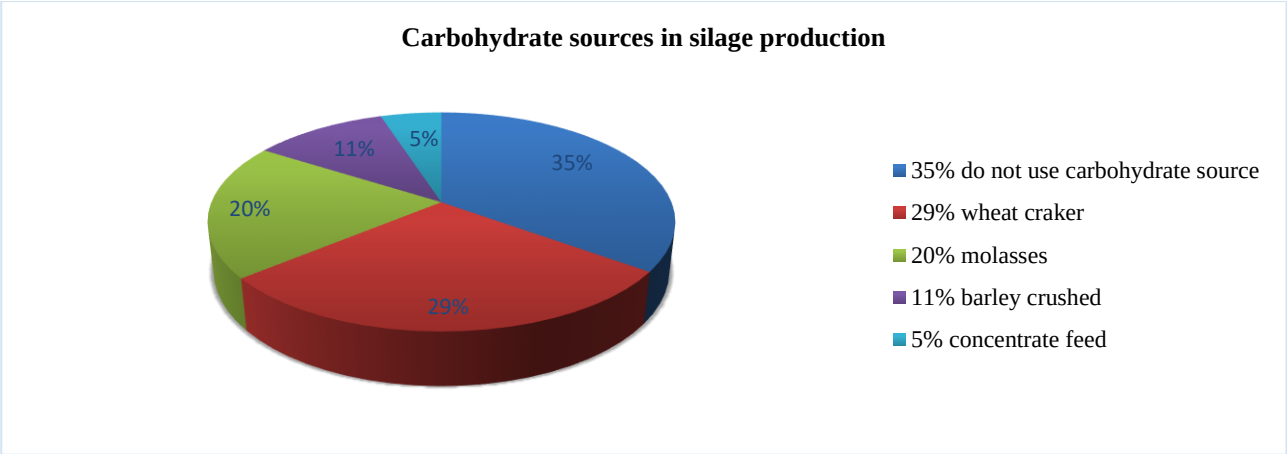

Figure 5. What do you use as a carbohydrate source?
Şekil 5. Karbonhidrat kaynağı olarak ne kullanıyorsunuz?

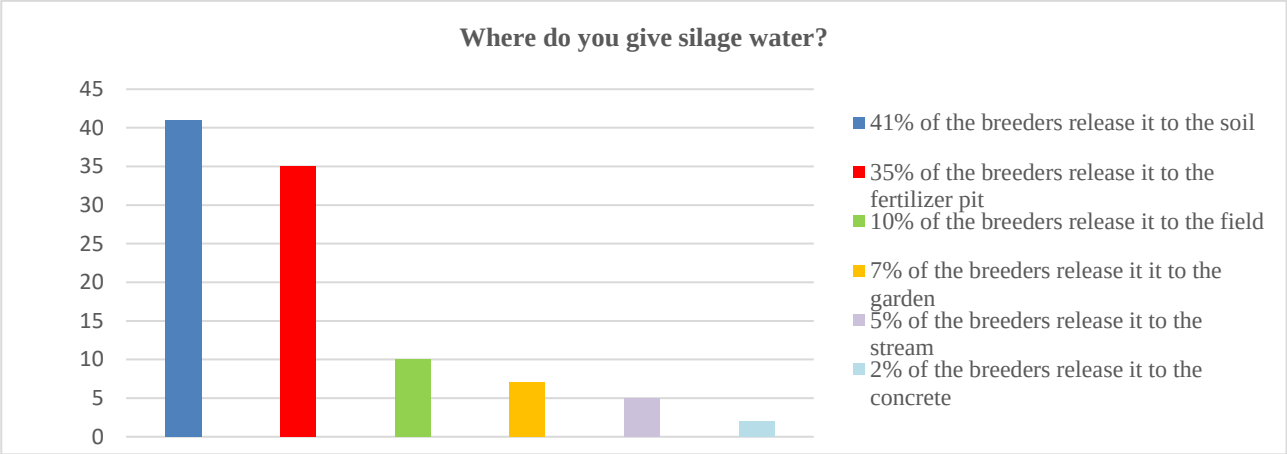

Figure- 6. Where do you release the silage water?
Şekil 6. Silaj suyunu nereye veriyorsunuz?

To the question of where do you release silage water, 41% said that they released it to the soil, while 35% stated that they released it to the fertilizer pit, 10% stated that they released it to the field, 7% stated that they released it to the garden, 5% stated that released it to the stream, and 2% said that they released it to the concrete (Figure 6). According to the survey results, it is understood that most of the animal breeders release silage water to the environment and do not pay due attention to the silage making stage. Silage making regulations should be applied at every stage of silage production. During the production and storage of silage, discharge of silage water into the soil or surrounding water resulting from poor drainage is harmful to the environment (Peterson et al., 1958). The Department for Environment Food & Rural Affairs (DEFRA) regulations numbered 1997/547 state at silage wastes are 100 times more polluting than untreated water. Therefore, care must be taken to minimize the risk of pollution by farmers (Aslım & Danış 2021).

When the breeders were asked about the daily milk yield of their cows, 30% of the the animal enterprises participating in the survey reported that they received 25 (lt / day) milk from their cows, while 28% reported that they received 20 (lt / day) milk from their cows, 24% reported that they received 15 (lt /day) of milk, and the remaining 18% stated that they received 30 and more (lt / day) of milk (Figure 7).

The survival rate of dairy cows can be met by ½ of the dry matter requirements from corn silage and the other half from quality legumes or grass hay. When asked how much silage they give to their milking cows per day, 70% of the breeders reported that they fed by 10-20 kg of silage/day to their cows, 27% of them reported that they fed by 20-30 kg of silage/day to their cows, and 3% of them reported that they fed by 30 or more kg of silage/day to their cows cows (Figure 8).

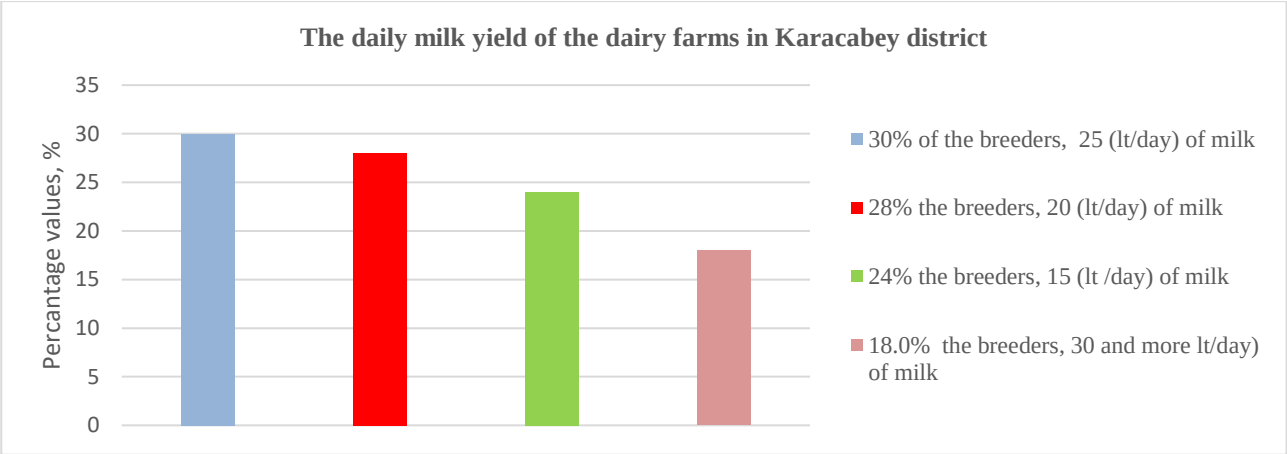

Figure 7. What does the daily milk yield of the cows in your business
Şekil 7. İşletmemizdeki ineklerin günlük süt verimi nedir?

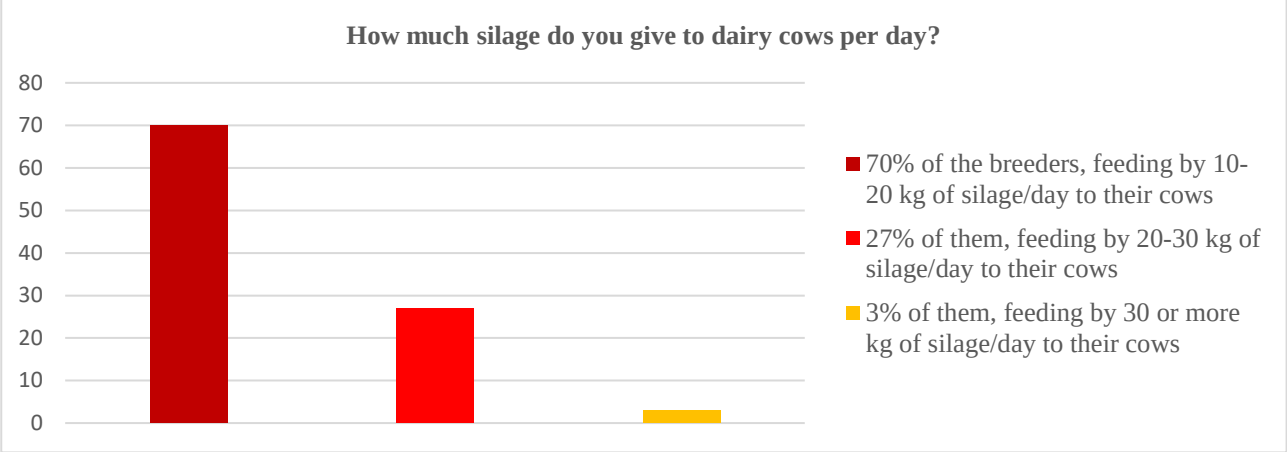

Figure 8. How much silage do you give dairy cows per day?
Şekil 8. Sağmal ineklerinize günde ne kadar silaj veriyorsunuz?

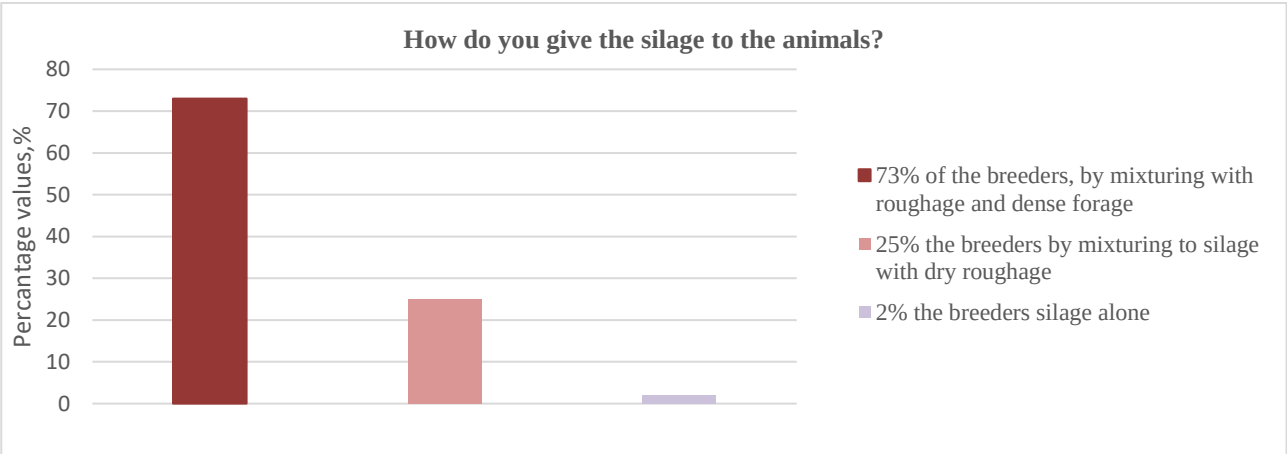

Figure 9. How do you give the silage to the animals
Şekil 9. Silajı süt ineklerinize nasıl veriyorsunuz?

When the breeders were asked about the method of feeding the silage to dairy cows, 73.0% reported that they gave silage to their cows mixed with roughage and concentrate feed, 25.0% reported that they gave silage to their cows mixed silage with dry roughage and 2.0% reported that they gave only silage to their cows. In the obtained questionnaire study, it is seen that the breeders mixed the silage with dry roughage and dairy feed Total Mixed Ration (TMR) for their cows. It is known that this mixture provides a more stable environment by

preventing pH fluctuations around the rumen (Görgülü, 2019; Değirmencioğlu, 2020). Thus, the evaluation efficiency of the feed by microorganisms increases. 30% of the breeders stated that they received 25 (lt /day) milk from their cows is in parallel with the results obtained. In general, in the Karacabey district, only 2% of the producers participating in the survey stated that they gave silage alone and 3% stated that they gave 30 or more kg of silage/per day. In contrast, (Akay & Dağdemir 2009; Denli et al., 2014) stated in their study that most of the producers misbehaved in the way of giving silage to animals. This may be due to interregional educational, and socio-economic differences.

Dairy cow nutritional diseases

When asked to rank the damage seen in animals as a result of excessive silage in your business, they stated that they were caught in first-degree stomach upset (abomasum displacement, second-degree diarrhea, and acidosis). It is known that it occurs when the abomasum is located on the right or left side of the rumen. With the birth of the calf and the throwing of the last, the movement area of the stomach parts in the abdomen expands. On the other hand, giving low-particle feeds such as corn silage to dry cows also increases the risk of abomasum slippage (Trimberger et al., 1972; Coppock, & Everett, 1973; Belyea et al., 1974; Görgülü, 2019). Acidosis causes a decrease in rumen pH, a decrease in the ratio of acetic acid and butyric acid in the rumen fluid, and an increase in the ratio of propionic acid, as a result of excessive amounts of easily soluble carbohydrates in cows. This suppresses healthy rumination, milk production and milk fat formation (Kleen et al., 2003; Maulfair et al., 2013). Similarly, the total feed mixture blended with 60% concentrated corn silage triggers the incidence of acidosis (Dänicke et al., 2020). As a matter of fact, the opinion of researchers (Trimberger et al., 1972; Coppock & Everett, 1973; Belyea et al., 1974; Görgülü, 2019; Dänicke et al., 2020) that abomasum displacement and incidence of acidosis increase in cows fed with corn silage is in line with the results of the survey.

4. Conclusion and Recommendations

As a result, it is seen that most of the breeders are dependent on maize for silage production and prefer the bulk-type silage. On the other hand, it has been determined that basic information about silage production and animal nutrition of small-scale livestock enterprises is insufficient.

In this context, it can be recommented the small-scale enterprises to participate in training of organization which will increase their knowledges on subjects such as silage making and animal feeding. It may be suggested that they use other forage crops (food pulp residues and heat-resistant fodder crops) as a source of silage and can also be fed their animals daily by using a large bank type silage collectively.

First of all, medium-sized enterprises can survive against large-scale enterprises in their commercial activities, depending on their reliability and awareness of animal products.

Forage production in Karacabey district is insufficient and dependent on outside sources. Encouraging breeders to produce forage crops can reduce the forage problem in livestock farming. Essentialy, complying with legal procedures when granting licenses to livestock farming during the establishment phase, destroying the waste genarated in accordance with the feed regulations, choosing natural additives when making silage, and thus teaching a lifestyle without harming nature; it is important for the protection of nature.

According to the results obdained in the surveys, the negative effects of silage on animals can also be seen. In such cases, problems may occur in the rumen and the microbial composition. On the other hand, negative effects may also be observed in the milk fat and reproductive fuctions of animals. The negative factors of silage affecting farm animals should be minimized. For this purpose, when feeding silage to dairy cows, supporting with quality roughage, the Neutral Detergen Fiber (NDF) range of ration and feeding in the form of TMR should be taken into consideration. Taking the necessary precautions against the negativities created by the survey results in dairy farms located in Karacabey; it is important in terms of bringing Turkish farmers and livestock into the economy.

Declaration

I declare that the author, familiar with the content of this article, has given permission for the article to be published in the format presented in the Journal of Gaziosmanpasa University Faculty of Agricultural.

Conflict of Interest

The author declares that he has no competing interests in this section.

Ethics committee certificate

A study was carried out in Karacabey enterprises in 2019. In the years before 2020, the ethics committee document was not requested in the journals, so it was not received.

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