

Determination of Nutrient Losses Caused by Starlings in Total Mixed Ration in Dairy Cattle Farm

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Abstract

Starlings are the birds of the sturnidae family (songbirds) of the passeriformes (starlings) and *Sturnus vulgaris* species of sturnus. Since the starlings are the birds that cause significant economic losses in agricultural and especially in livestock enterprises, necessary measures should be taken within the scope of herd management. Starlings are invasive and predatory birds that cause serious damage to all kinds of agricultural activities. In the dairy cattle fed with total mixed ration, starlings consume grain and pellet feeds and rapidly reduces the milk yield by changing the nutrient composition of the ration. It may also serve as a disease vector.

The aim of this study was to determine the nutritional losses caused by starlings in a total mixed ration in a dairy cattle farm. According to the results of the analysis before and after the infestation of starling, an increase ($P<0.05$) in the moisture (%), crude fat, ADF, NDF and cellulose values of DM % were observed. After the starlings infestation and plucking, energy (ME, kcal/kg) and starch content were lower ($P <0.01$). These showed that birds decreased the nutritive value of TMR by consuming the grain component of the TMR.

Keywords: Total mixed ration, dairy cattle, starlings, damage, nutrient losses

Süt Sığırısı İşletmesinde Tam Rasyonda Sığırcıkların Neden Olduğu Besin Kayıplarının Belirlenmesi

Öz

Sığırcıklar passeriformes (ötücü kuşlar) takımının sturnidae familyasının (sığırcıkgiller), sturnus cinsinden *Sturnus vulgaris* türünden kuşlardır. Sığırcıklar tarımda ve özellikle hayvancılık işletmelerinde önemli ekonomik kayıplara sebep olduğundan, sürü yönetimi kapsamında gerekli önlemler alınmalıdır. Sığırcıklar her türlü tarımsal faaliyete ciddi zarar veren istilacı ve yırtıcı kuşlardır. Tam rasyonla beslenen süt sığırlarında, tahıl ve pelet yemleri tüketirler ve rasyonun besin bileşimini değiştirerek süt verimini hızla azaltır. Aynı zamanda bir hastalık vektörü olarak işlev görebilmektedirler.

Bu çalışma, bir süt sığırcılığı işletmesinde tam rasyonda sığırcıkların yol açtığı besin madde kayıplarının belirlenmesi amacıyla yapılmıştır. Çalışmada sığırcık istilasından önce ve sonrasındaki analiz sonuçlarına göre rasyonun nem (%), ham yağ, ADF, NDF ve ham selüloz değerlerinde bir artış gözlenmiştir ($P<0.05$). Sığırcık istilasından sonra tam rasyonun ME ve nişasta içeriğinin düştüğü ($P<0.01$) belirlenmiştir. Bu durum kuşların tam rasyonun dane unsurlarını tüketerek rasyonun besin değerini düşürdüğünü göstermektedir.

Anahtar kelimeler: Tam rasyon, süt sığırısı, sığırcık, zarar, besin madde kayıpları

Introduction

Livestock activities are commercial activities. Dairy cattle is also evaluated in this context and should be managed in accordance with commercial principles. One of the problems faced by the management in the winter months is the damage caused by the starlings and subsequent losses. Therefore, it is necessary to have knowledge about the biology and especially the behavior of the starling birds.

Starlings are the birds of the sturnidae family (starlings) of the passeriformes (starlings) and *sturnus vulgaris* species of sturnus. The starlings, which have a size of approximately 20 cm, are also migratory birds. The body is black except the wing tips, but it has many bright white spots (Ransome, 2010; Anonymous, 2014; Anonymous, 2018a; Anonymous, 2018b). In April, they make 4-6 blue eggs and incubation period is about 13 days and they can incubate three times a year. The starlings are an omnivorous animal with unique jaw muscles and beak structures that can be fed with insects, unique seeds and fruits. These birds, which generally appear to be beneficial to farmers by eating snails, worms, spiders, mosquitoes, moths, dragonflies, grasshoppers, bees, ants and similar insects, have become famous for their damage to fruits and cereals (Anonymous, 2018b).

Since the starlings are the birds that cause significant economic losses in agricultural enterprises and especially in livestock enterprises, necessary measures should be taken within the scope of herd management. Starlings are invasive and predatory birds that cause serious damage to all kinds of agricultural activities. In the dairy cattle fed with total mixed ration, it considers the feeds of stalks grains and pellets, and rapidly reduces the milk yield by changing the nutrient composition of the ration. The starlings are the birds that need to be considered because of the looting, the loss of productivity, infected diseases of the feces and the environmental pollution caused by their feces (image and odor). Shipton et al. (2012) stated that starlings reach farms immediately after the first light of day. Flock of starlings (1000 birds) can consume 16-18 kg of feed per day (Schoonmaker, 2013). Starlings are "selective" eaters, for example, in a compound feed they select the parts they want to eat, and in doing so they change the general nutrient balance of the existing mixed feed (Watson, 2013). Linz et al. (2007) reported that starlings can eat 7-23 g of animal food per day and 20-40 g of plant seeds. Fischl and Caccamise (1985) reported that 62% of the starling feeds were of vegetable origin and 21% were animal materials, but these rates could vary depending on the season. Lee (2005) reported that the starlings consumed about 0.8 kg of feed per month, and half of the feed consumed was consumed from the feeder. They usually consume more expensive ingredients such as protein-rich pellets and grains, but rarely consume roughage.

In this study, it was aimed to determine the size of losses of nutrient in total mixed ration due to invasive and predatory starlings in a dairy cattle farm.

Materials and Methods

Dairy cows that are Holstein breed from the Special Farm of Aksaray province of Turkey were used for this study. Dairy cows were separated into different feeding groups according to daily milk yield during lactation and fed ad libitum with a total mixed ration (TMR). TMR sampling was taken from fresh milking group. TMR contains corn silage, alfalfa silage, triticale silage, dehydrated alfalfa and concentrated feed containing 20% protein and 2750 ME/kg, analyzed values offered to milking cows. The TMR samples were taken from five different regions every 10 meters from the beginning of the feed before feeding. Samples were taken from the same regions after feeding 1-1.5 hours after feeding. Fifty feed samples taken into locked pouches were stored at +4 °C until analyzed. Samples were analyzed by NIR device. The NIR device has wide application calibrations that can accurately measure moisture, protein, oil, and more, giving accurate results (DA 7250™ NIR analyzer).

The nutrient values of the pre- and post-feeding samples were calculated by using the paired t-test with the MINITAB statistical package program (Minitab, 2010).

Results and Discussion

Both Figure 1 and Figure 2 are the images of TMR that are caused by the looting of grain and pellet feeds and reflecting the severity of the looting. Table 1 shows the changes in nutrients that occur in ration due to invasive and predatory starlings in a dairy cattle farm.



Figure 1. Image caused by looting (grooves)



Figure 2. Image due to looting (grooves)

Table 1. The results of analyzed values of nutrient offered to milking cows in both pre-feeding (total mixed ration; TMR) and post-feeding (one hour after feeding) (based on DM, %).

Variables	Pre-feeding (TMR)	Post-feeding (one hour after feeding)	P
Moisture	45.40±0.306	46.55±0.412	0.013
Crude fat	0.183±0.001	0.187±0.001	0.013
Metabolic energy (ME, kcal/kg)	2674.30±4.40	2643.59±6.07	0.000
Acid detergent cellulose (ADF)	17.01±0.174	18.06±0.300	0.001
Neutral detergent cellulose (NDF)	31.29±0.357	33.59±0.544	0.000
Crude Ash	7.51±0.070	7.57±0.045	0.509
Crude Cellulose	16.22±0.210	17.60±0.359	0.000
Crude Protein	16.96±0.239	16.71±0.338	0.451
Crude Starch	27.34±0.279	24.16±0.383	0.000

As can be seen from Table 1, after the starlings infestation and looting, an increase ($P > 0.05$) in the Moisture (%), crude fat, ADF, NDF and cellulose values were observed. After the starlings infestation and plucking, a decrease ($P < 0.01$) in ME and starch values were observed. Immediately after the feeding, a reduction of about 1.15% in the ME and 11.6% in the starch were observed. This reduction may negatively affect the cost of ration, but if not taken, it will cause a decrease in milk yield. As a result of the heavy looting and grain and protein-rich pellet feeds by starlings, it can be explained that the proportion of roughage with high density is increased in favor of roughage in the samples, and the humidity can be increased by 15% during the looting due to high density of stools.

At the same time, the increase in the content of cellulose by 1.38% can be interpreted as proof of the sacking of concentrate feed. Starlings not only reduce the energy and starch levels of the ration, but also consume a significant amount of feed (especially in winter months, it is reported that a stall of 2000 starlings could consume 1-2 tons of feed in a month and could contaminate a feed of 500-1000 kg (Figure 4) (Burn, 2015). When the factors are taken into consideration, only the losses due to the feed consumed by starlings is 24.000-48.000

Turkish Lira and the amount of damage caused by the loss of nutrients in feed (especially ME and CP) and the decrease in milk yield is very high. It was reported to be 800 \$ million in USA (Pimentel et al., 2000).

When it is considered that starlings can create larger flocks (Figure 3) and it is added to the damages caused by diseases caused by starlings, it is obvious that losses in cattle farms can be much more. Harmful bird populations (starlings and pigeons) are estimated to cause an annual loss of \$ 100 million to the United States due to microbial contamination (Lee, 2005).



Figure 3. Flocks of starlings in dairy farm

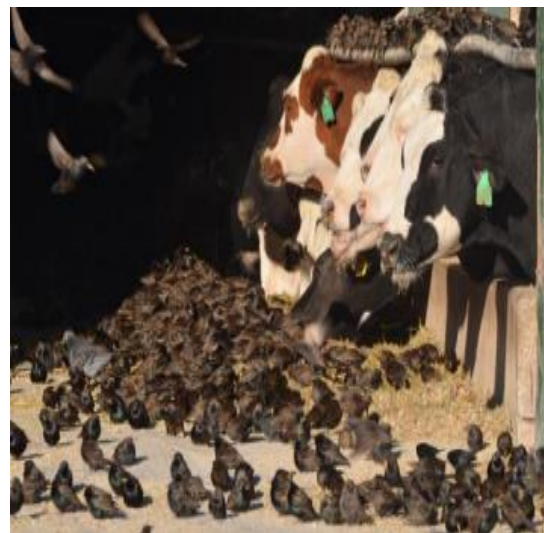


Figure 4. Looting of starlings in dairy farm

Conclusion

In cattle farms, only the ration's nutrient composition does not change after the straw infestation and looting, and the milk yield is reduced, leading to significant economic losses due to the feed and contamination. The cattle farms will have to pay a separate cost to combat the starlings, as they understand the damage caused by the starlings. For example, sound bird repellents (gas cannons, fireworks, sound shields and bio-acoustic deterrent), aircraft (drones), lasers, dogs, bird of prey and human models and handrails, webs, balloons etc. It will also need to be charged.

Considering the changes in nutrient composition, possible loss of milk yield, feed consumption, losses due to diseases and measures to be taken for prevention, it is a very demanding and costly herd management activity to protect the enterprise from starlings which are invasive.

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