IKR Journal of Multidisciplinary Studies (IKRJMS)

Journal homepage:https://ikrpublishers.com/ikrjms/
Volume-1, Issue-1(March-April) 2025
ISSN:XXXX-XXXX(Online)

Received: 28.02.2025 *Accepted:02.03.2025* *Published:09.03.2025*

IMPROVED QUALITY OF SILAGE MADE FROM DWARF ELEPHANT GRASS AND FINE RICE BRAN WITH THE ADDITION OF COMMERCIAL CULL SYRUP

Rezki Amalyadi[1]

[1] Department of Animal Science, Faculty of Animal Science, University of Mataram, Mataram, Indonesia

**Corresponding author: Rezki Amalyadi [1]*

Abstract

When feed supplies are limited, silage, a byproduct of the feed preservation process, is intended to increase feed availability. The ensilage process may be accelerated by using glucose-rich commercial syrup that has gone bad. The purpose of this study was to assess how adding commercial syrup that had expired would affect the silage properties of a blend of fine rice bran and dwarf elephant grass. Additionally, the concentrations of ammonia, total volatile fatty acids (VFA), and water-soluble carbohydrates (WSC) were measured. This experiment used a completely randomized design with five replications and four treatments. The following is how the treatments were distributed: Odot grass and fine rice bran at a dry matter ratio of 7% made up the first treatment (P1), which acted as the control. Commercial syrup was added to the second treatment (P2), third treatment (P3), and fourth treatment (P4) at a dry matter ratio of 8%, 10%, and 12%, respectively. For thirty days, the ensilage process was carried out at room temperature. pH, water soluble carbohydrates (WSC), ammonia, total volatile fatty acids (VFA), and dry matter loss were among the characteristics that were assessed. The analysis of variance was applied to the data. The Duncan multiple range test at the 5% significance level was then used to compare the various treatments .The results showed that adding expired commercial syrup up to 12% DM significantly increased the generation of lactic acid, which in turn caused the pH to drop toward an acidic level and the ammonia content to decrease. The total VFA did, however, vary somewhat among treatments, including dry matter loss, and there was no statistically significant difference between treatments that received expired commercial syrup as a supplement. In summary, silage made from dwarf elephant grass and fine rice bran can have its ammonia level decreased and its total volatile fatty acid (VFA) content increased by using 10% DM of expired commercial syrup.

Keywords: *commercial syrup waste, feed preservation, feed quality, odot grass, fine rice bran.*

Introduction

One of the most productive grass species with a substantial nutritional content is dwarf elephant grass (*Pennisetum purpureum* variation Mott). Compared to other grass types and elephant grass, it is physically smaller (Minson 2012). According to Hedayatullah and Zaman (2019), dwarf elephant grass thrives in a range of soil types and reacts favorably to fertilization. When mowed occasionally, it continuously generates new shoots and grows in clumps (Utomo, 2021). According to Alifia and Hartutik (2018), dwarf elephant grass has a nutritional composition of 13.2% crude protein, 30.6% crude fiber, 2.35 percent crude fat, and 18.1% ash. Fine rice bran can be used as an energy source in the feed formulation to help dwarf elephant grass overcome its high crude fiber Content.

The rice plant produces fine rice bran as a byproduct. It contributes fiber to feed and, because of its high carbohydrate content, can be used as an energy source (Utomo2021). Lactic acid bacteria use these carbohydrates as substrates to create acidic chemicals that lower pH and stop the growth of infections and spoilage bacteria (Esen et al., 2024). These feed materials can be used fresh or processed into silage due to their high nutritional content and plentiful production of fodder and rice bran (Wati et al., 2018).

Ruminants are fed silage, a fermented feed that has a highwater content (McDonald et al., 2022). A variety of grasses, including maize, sorghum, and other grains, as well as plantation and agro-industrial by-products, including soy sauce pulp, tofu pulp, and beer pulp (Sadarman et al 2019), are used in the silage-making process (Bakare et al 2023; Minson

2012). According to Kondo et al. (2016), silage is primarily made to preserve feed, minimize nutrient losses, and guarantee its availability throughout the dry season.

Reducing protein degradation during the enzymatic process is the goal of the silage-making process (Irawan et al., 2021). Feedstuffs are stacked in silo containers, covered with plastic, or rolled into big rolls to create silage (Kondo et al., 2016). During the ensilage process, beneficial bacteria including lactic acid bacteria (LAB) can develop in the silo's anaerobic environment (Jayanegara et al 2017).

The fundamental idea behind creating silage is to quickly manufacture lactic acid by establishing anaerobic conditions (Guamán et al., 2023). Physical characteristics like color, texture, and scent (Kondo et al., 2016), as well as dry matter loss and fungal presence after harvest (Dryden, 2021), are indicators of good silage. Furthermore, anaerobic fermentation profiles including pH, water soluble sugar concentration, ammonia, and flying fatty acids, or VFA, can be used to evaluate the quality of silage (Hynd 2019). Many beneficial bacteria, including LAB, can speed up fermentation when the pH drops toward acid (McDonald et al 2022).

Water-soluble carbohydrate substrates are necessary for LAB growth and are transformed into organic acids that can stop the growth of harmful bacteria (Irawan et al., 2021). Because of its high glucose content, molasses is frequently fed to silage as a source of carbohydrates (Chalisty 2021; Sadarman et al 2023). However, if molasses is not accessible, commercial corn syrup, which similarly has a high glucose concentration, may be used as a replacement (Sadarmanetal. 2022). Based on these data, the purpose of this study was to assess how the production of silage from fine rice bran and dwarf elephant grass affected dry matter loss, pH, WSC, ammonia, and total VFA.

Materials and Methods

Dwarf elephant grass, fine rice bran, and distilled water were the ingredients used in this investigation. They used H_2SO_4, 95-97%, Na_2CO_3, boric acid solution, NaOH 0.50 N, and 18% phenolphthalein for pH, WSC, ammonia, and total VFA measurements. According to Cetinkaya-Rundel and Hardin (2021), this study was experimental and used a completely randomized design with four treatments and five replications. The treatments included the preparation of silage using fine rice bran and dwarf elephant grass, along with the addition of a commercial syrup to provide glucose. The amount of commercial syrup added is consistent with the methods that Sadarman et al. (2022) suggested.

The following are the specifics of the treatment: P1 (control) contains 7% DM of odot grass and fine rice bran; P1 + 8% DM, P1 + 10% DM, and P1 + 12% DM of commercial syrup. During the investigation, the dwarf elephant grass was gathered over 60 days after it was planted, at a stage in its life cycle. The following are the physical requirements for collected dwarf elephant grass: There should be no brown stains or yellow discoloration on the leaves, and the grass should be fresh and green. The stem segments should be 15 cm long, and the stem height should be between 30 and 40 cm.

To fill 25 silos, each weighing 1500 g, the Odot grass was chopped with a chopper. It was then completely combined with commercial syrup Afkir and fine rice bran, which had first been diluted with 100 mL of distilled water per treatment unit. Before being put into the silo, the components of each therapy were mixed until they were uniform. Then, until the conditions inside the silo were anaerobic, the contents were compressed and sealed hermetically. The silo was kept for 30 days in a location that was not exposed to direct sunlight.The content and nutritional value of commercial afkir syrup can be seen in Table 1.

Table 1. Content of Marjan melon flavored syrup

Nutritional Value Information of Marjan Melon Flavored Syrup		
Serving size 30 ml		
15 servings per package		
QUANTITY PER SERVING		
Total energy	**130 kcal**	
Energy from fat	0 kcal	
Energy from saturated fat	0 kcal	
		%NAN*
Total fat	0 g	
Trans fat	0g	0%
Cholestrol	0mg	0%
Saturated fat	0g	0%
Protein	0g	10%
Total carbohydrate	32g	
Sugar(**Glucose**)	31 g	
Salt (Sodium)	5 mg	0%

The silage was collected on the 30th day and analyzed to measure its pH, ammonia, water soluble carbohydrates (WSC), and total volatile fatty acid (VFA) content. A representative sample of silage was collected, then transferred into a pH measuring container (either a measuring cup or test tube), and either distilled water or a buffer solution (in a ratio of 1:9 b/v) was added. This was one of the variables observed in the study, specifically the measurement of silage pH (Bernardes et al 2019). Additionally, a pH meter is used to determine the sample's pH. This procedure was repeated until the final sample was produced, and the pH readings were noted for further study.

Water-soluble carbohydrates (WSC) in silage were measured by extracting the soluble carbohydrates from silage samples using a solvent containing 18% phenolphthalein and 5 millilitres of concentrated H_2SO_4. A spectrophotometer with a wavelength of λ 490 nm was used to assess the WSC content after both were vortexed until they were homogenous (McDonald et al 2022).

A silage sample was first taken, and then ammonia was extracted using a particular solvent, such as water or a buffer solution, in order to measure the amount of ammonia in the silage. The spectrophotometric approach, as outlined by Conway (1948), was then used to analyze the ammonia content.

To determine the amount of total volatile fatty acid (VFA) in silage, a sample of silage must be taken, VFA must be extracted using an acid solvent, and the total VFA concentration must then be determined using spectrophotometric methods (Katoch 2023).In order to determine the percentage of dry matter loss in silage, the initial weight of the silage sample and its final weight following the ensilage process are measured. The resulting weight difference is then calculated using the corresponding formula, which is (Initial weight) – ((Final weight)): ((Initial weight) x 100%). (Sadarman and colleagues, 2023c). The Statistical Package for the Social Sciences (SPSS) version 27.0 application was used to process the collected data (Sujarweni and Utami 2023). Duncan's Multiple Range Test (DMRT) 5% was used for additional testing if the analysis of variance results indicated a significant effect.

Result

Silage pH

A key determinant of the quality of the silage produced is the acidity or basicity of the silage, as indicated by pH. The lactic acid bacteria (LAB) fermentation process lowers the pH in the silo by converting the feed's carbohydrates into lactic acid. This acidic environment helps to preserve the feed by inhibiting the growth of dangerous microorganisms and keeping the silage's nutritional value. Table 2 provides information on the pH of silage made from refined rice bran (RRB) and dwarf elephant.

Table 2. pH of odot and refined rice bran based Silage

Treatment	pH
P1: Odot Grass + Fine Rice Bran 7% DM (control)	$3{,}81^{a}\pm0{,}06$
P2: P1 + Rejected commercial syrup 8% DM	$3{,}73^{b}\pm0{,}01$
P3: P1 + Rejected commercial syrup 10% DM	$3{,}71^{b}\pm0{,}03$
P4: P1 + Rejected commercial syrup 12% DM	$3{,}70^{b}\pm0{,}04$

Notes: Data shown are mean ± standard deviation. Different superscripts in the same column indicate significant differences (P<0.05).

WSC content of silage

Glucose, fructose, sucrose, and a trace quantity of hydrolyzable complex carbohydrates, such as certain kinds of starch, are all considered water-soluble carbohydrates (WSC). Table 3 shows the amount of water-soluble sugar in silage prepared from refined rice bran and odot.

Table3. Odot and refined rice bran based silage wsc

Treatment	WSC (%)
P1: Odot Grass + Fine Rice Bran 7% DM (control)	$5{,}48^{c}\pm0{,}05$
P2: P1 + Rejected commercial syrup 8% DM	$3{,}80^{b}\pm0{,}09$
P3: P1 + Rejected commercial syrup 10% DM	$1{,}50^{a}\pm0{,}07$
P4: P1 + Rejected commercial syrup 12% DM	$5{,}65^{d}\pm0{,}11$

Notes: Data shown are mean ± standard deviation. Different superscripts in the same column indicate significant differences (P<0.05).

Ammonia silage

The byproduct of the fermentation process of silage is silage ammonia. Under anaerobic circumstances, bacteria break down the feed's proteins into amino acids, which are then converted to ammonia. Excessive protein breakdown may be indicated by high ammonia levels in silage, which may compromise the silage's nutritional value and digestibility. Table 4 displays the ammonia content of fine rice bran and dwarf elephant silages.

Table 4. Ammonia content of odot and refined rice bran based silage

Treatment	Ammonia (mM)
P1: Odot Grass + Fine Rice Bran 7% DM (control)	$1{,}90^{a}\pm0{,}16$
P2: P1 + Rejected commercial syrup 8% DM	$1{,}45^{b}\pm0{,}13$
P3: P1 + Rejected commercial syrup 10% DM	$1{,}73^{a}\pm0{,}25$
P4: P1 + Rejected commercial syrup 12% DM	$1{,}90^{a}\pm0{,}16$

Notes: Data shown are mean ± standard deviation. Different superscripts in the same column indicate significant differences (P<0.05).

Total VFA silage

The quantity of volatile fatty acids, such as butyric, propionic, and acetic acids, generated during fermentation is included in the total VFA in silage. In addition to influencing the silage's digestibility, nutrition, and storability, this measurement is crucial for assessing the fermentation quality of the product and may offer hints regarding its suitability as animal feed. Table 6 shows the total VFA content of silage produced from fine rice bran and feed.

Table 5. Total VFA content of odot and refined rice bran based silage

Treatment	Total VFA (mM)
P1: Odot Grass + Fine Rice Bran 7% DM (control)	$53{,}5^{b}\pm2{,}52$
P2: P1 + Rejected commercial syrup 8% DM	$50{,}8^{b}\pm2{,}06$
P3: P1 + Rejected commercial syrup 10% DM	$55{,}4^{a}\pm5{,}04$
P4: P1 + Rejected commercial syrup 12% DM	$49{,}9^{c}\pm2{,}52$

Notes: Data shown are mean ± standard deviation. Different superscripts in the same column indicate significant differences (P<0.05).

Dry matter loss of silage

The reduction in dry matter that occurs during the production and storage of silage is known as dry matter loss in silage. Since dry matter is a crucial component that gives animals nutrition, dry matter loss during the silage-making process might be an issue. Table 6 shows the DM loss of silage prepared from refined rice bran and dwarf elephant.

Table 6. Dry matter loss of odot and refined rice bran based silage

Treatment	Dry Matter Loss (%)
P1: Odot Grass + Fine Rice Bran 7% DM (control)	9,26^{a}±3,92
P2: P1 + Rejected commercial syrup 8% DM	5,90^{b}±2,40
P3: P1 + Rejected commercial syrup 10% DM	5,29^{b}±1,17
P4: P1 + Rejected commercial syrup 12% DM	4,61^{b}±1,63

Notes: Data shown are mean ± standard deviation. Different superscripts in the same column indicate significant differences (P<0.05).

Discussion

Silage pH

Commercial Rejected Syrup (CRS) had a significant (P<0.05) impact on the pH of silage prepared from refined rice bran and odot. The pH difference between treatments was validated by the 5% DMRT test findings, which showed that the pH of silage from P2 to P4 differed considerably from P1 or control. This demonstrates how microorganisms can use the sugar in commercially rejected syrup to proliferate, make more lactic acid, and bring the pH down to an acidic level. As a result, undesirable bacteria' growth can be suppressed, resulting in high-quality silage.

It is advised to use commercial rejected syrup while preparing silage since, according to Sadarman et al. (2022), adding more of it can lower the pH value and DM loss more effectively than the control. Commercial rejected syrup can be used in place of molasses while creating silage, according to Sadarman et al. (2023). However, it has a major effect on a number of parameters, including pH, fungal growth, ammonia content, total VFA output, and fleigh value of corn stalk silage. Additionally, according to Sadarman et al. (2023), using commercially rejected syrup might enhance the quality of organic market waste silage, particularly by lowering the pH towards an acidic condition and minimizing dry matter loss.

The use of expired commercial syrup, a sugar-rich beverage, as an addition speeds up fermentation by giving microorganisms a source of energy. This is consistent with McDonald et al.'s (2022) results that high-sugar stimulant additions might improve microbial performance during fermentation, lowering pH to an acidic level. Based on its acidity level, silage was divided into four groups by Sandi et al. (2019), with pH 3.20–4.20 being regarded as very good and pH > 8 as unsatisfactory. Low pH silage helps prevent the growth of rot-causing bacteria and fungus, according to Bartosik et al. (2023).

The pace at which organic acids, particularly lactic acid, are formed affects the acidity level of silage (Jayanegara et al 2017). Faster lactic acid generation, according to Irawan et al. (2021), will make the silo more acidic, which will lower the pH of the silage and prevent the growth of Clostridium sp. bacteria. According to Bakare et al. (2023), the activity of Clostridium sp. bacteria will entirely cease at a pH lower than 4.20, allowing the silage to be classified as excellent.

WSC content of silage

The WSC concentration in Odot and refined rice bran silages was affected (P<0.05) by the addition of rejected commercial syrup up to 10% DM. WSC is a water-soluble carbohydrate that is crucial to the fermentation of silage and animal feed. WSC gives ruminants a quick source of energy after it is transformed into glucose. The WSC content of P1 and silage supplemented with rejected commercial syrup differed, according to the findings of the 5% DMRT test.

This condition showed that the addition of rejected commercial syrup had not been able to raise the soluble sugar content in silage from Odot and DPH, even though P1 had a WSC content that was almost 5.48% greater than P2 and P3, which received rejected commercial syrup at about 8 and 10% DM, respectively. The low WSC concentration in silage may be caused by a number of factors, including storage procedures, silo conditions, and raw material conditions. P2 silages with 8% DM of rejected commercial syrup had a different WSC level than P3 and P4. Additionally, P3's WSC material differed from P4's.

With the addition of rejected commercial syrup 12% DM, P4 had the highest WSC content in silage from Odot and DPH, but P1 or control had a WSC content that was roughly 1.50% higher with the addition of rejected commercial syrup 10% DM.A number of important factors combined to create the significant increase in WSC in P4. By adding 12% dry matter (DM) alternative carbohydrate (ACS) to P4, more water-soluble carbohydrates were available to serve as a substrate for lactic acid bacteria during fermentation, boosting the amount of lactic acid produced and improving fermentation efficiency.

Stable and quick anaerobic conditions are produced in the silo by combining premium raw materials like odot grass and refined rice bran with the best commercial syrup that has been rejected and by managing the silo well to stop microbial contamination and oxygen intrusion. This can keep more WSC in the silage and lessen harmful enzymatic and microbiological activity. When combined, these elements improve the availability and retention of water-soluble carbohydrates, leading to higher-quality and more WSC-containing silage. Water-soluble carbohydrates aid in the fermentation of lactic acid bacteria, which generate lactic acid and preserve the required anaerobic conditions during the

silage-making process (Hynd, 2019).
Because the amount of water-soluble carbohydrates (WSC) in feed ingredients might impact the fermentation process and nutritional quality, Esen et al. (2024) emphasized the significance of managing the amount of WSC in animal feed and silage production. Water-soluble carbohydrates (WSC) play a key role in silage's production of lactic acid, which lowers pH. When the WSC of the forage is low, fermentation ceases (McDonald et al. 2022).
A good forage for silage needs to have a dry matter content of more than 200 g kg-1, a low buffering capacity, and enough WSC, which should be between 5 and 20% (Hynd 2019). Numerous factors, including fodder species, development stage, cultivation, environment, age, and harvest time, might affect the instability of WSC concentration in P1 to P4 (Dryden 2021). Tropical and temperate forages differed in WSC, according to Minson (2012). The fructans found in WSC in tropical forageswhich are primarily temperateare easily fermented by LAB (Guamán et al., 2023).

Ammonia silage

The silage's ammonia content differed among treatments in this investigation. The ammonia content was found to be substantially lower in treatment P2, when commercial waste syrup was added up to 8% DM, than in the other treatments. This indicates that the silage's ammonia content is lowered when expired syrup is added at this amount. However, compared to P2, the ammonia concentration in the other treatments (P1, P3, and P4) was higher and essentially the same.
This discrepancy results from the presence of various microbial activity in each treatment's fermentation process. Protein breakdown into ammonia can be slowed down by adding leftover syrup to P2, which can improve the silo conditions for lactic acid bacteria. Ammonia levels in alternative treatments, on the other hand, might be more comparable due to more comparable microbial activity. The ammonia level of silage is a crucial factor that is frequently taken into account while preparing silage due to its beneficial impact on the health and nutritional quality of animals, claim McDonald et al. (2022).
According to Dryden (2021), elevated ammonia levels may be a sign of excessive protein breakdown, which can lower the nutritional value of silage and result in health issues for animals such irritated digestive tracts and decreased productivity. Furthermore, feeds with high ammonia concentrations are typically rejected by cattle, which can lower feed intake and total livestock output (Wahyudi 2019).
The ammonia concentration of silage may be decreased by using high glucose rejected syrup. The nutritional qualities of the syrup have an impact on the reducing process. During the ensiling process, glucose, the primary ingredient in rejected syrup, provides bacteria with a quick supply of energy.
Microbes are more likely to create organic acids than ammonia when they use glucose as an energy source. Accordingly, using commercial high-glucose rejected syrup can cause microbial metabolism to change in favor of producing organic acids, which can ultimately lower the amount of ammonia produced in silage (Olijhoek et al 2023; Sadarman et al 2023).Kung Jr. et al. (2018) state that good silage has less than 5 mM ammonia; if it does, it must be lowered by choosing raw materials with the right amount of protein and regulating pH during the ensiling process. According to Muck (2018), silage additives can also aid in reducing the activity of ammonia-producing bacteria.In order to increase the nutritional quality of the silage and lower the possibility of excessive ammonia generation, it is also important to monitor and control the silage process.

Total VFA silage

One crucial metric for assessing the degree of fermentation and nutritional value of silage is its total volatile fatty acid (VFA) concentration (Gomes et al., 2019). The total VFA content varied significantly between treatments in this investigation. Compared to the treatments that received more commercially rejected syrup (P2 and P4), the control treatment (P1) displayed a greater or comparatively comparable total VFA content value. This is unexpected since it is generally anticipated that adding rejected syrup that is high in glucose will boost the formation of VFA. Nonetheless, P3 had a larger overall VFA content value than the other treatments, and P4 had a lower value.
According to McDonald et al. (2022), the total VFA content in this study was lower than the typical total VFA content of 55–65 mM. This discrepancy could result from intricate relationships between environmental variables, microbial activity, and nutritional components throughout the ensilage process, in addition to other elements such differences in the microbial makeup of each treatment that may have an impact on the generation of VFA.According to McDonald et al. (2022), microbial fermentation during the ensilage process produces volatile fatty acid, which aids in the digestion and nutritional value of animal feed. When the VFA content is at its ideal level, the fermentation process is proceeding smoothly and yielding nutrients that are beneficial to cattle.
The quality and nutritional value of silage may suffer if the VFA content is insufficient or unsuitable, as this may suggest inefficiencies in the ensilage process or fermentation issues (Gomes et al 2019; Sadarman et al 2023). According to Sadarman et al. (2023), commercial rejected syrup high in glucose influences the composition of microbial fermentation in silage, which is related to the findings of this study and the association between its use and a drop in the total VFA content in silage at P4.
Because microorganisms prefer to use glucose as an energy source, they produce more organic acids and produce less total VFA, which is the process causing the drop in total VFA content. According to Olijhoek et al. (2023), microorganisms are more likely to use glucose to create organic acids than VFA when silage contains a lot of glucose sources. VFA output can be decreased as a result. Dryden (2021) described the procedures for maximizing the overall VFA content in

silage, which include choosing the appropriate raw materials, managing the material's moisture and density, adding additives like urea or propionic acid, and keeping an eye on the pH both throughout the ensilage process and during silage storage. Therefore, the nutritious value of the silage produced is reflected in excellent VFA production.

Dry matter loss of silage

The loss of DM in silage prepared from refined rice bran and odot was impacted ($P<0.05$) by the addition of rejected commercial syrup up to 12% DM. P1, which ensiled a mixture of odot and refined rice bran without using rejected commercial syrup, had the greatest DM loss in this investigation. Odot and refined rice bran silage with varying DM loss values, ranging from 5.90% to 4.61%, were produced by adding rejected commercial syrup 8–12% DM, according to the results of the 5% DMRT test. However, statistically, the loss of DM of the combination of odot and DPH refined rice bran silage supplemented with rejected commercial syrup up to 12% DM did not differ between treatments.

This is caused by a number of factors that are similar, including the same quality of starting materials, similar processing of materials, the presence of external variable controls, the possibility of natural variability factors, the insensitivity of measurement methods to detect small differences in dry matter loss, and the difficulty in detecting significant differences in research with small sample sizes. When evaluating the effectiveness of ensiling, dry matter loss is a crucial consideration (McDonald et al., 2022). This state is a result of beneficial bacteria's inability to quicken the ensiled material's pH decline. The proliferation of Lactic Acid Bacteria causes the pH in the silo to drop dramatically throughout the forage ensiling process, creating acidic conditions.

Unwanted microorganisms like Clostridium sp. cannot develop in these acidic circumstances (Abrar et al 2019). According to Borreani et al. (2017), preventing Clostridia sp. from growing during the ensiling process can reduce dry matter loss. This can be accomplished by giving lactic acid bacteria a soluble substrate to feed on, which can hasten the ensiling process.Research findings that show no differences in dry matter loss do not always imply that the therapies under investigation are identical in every way. While taking into account variables that could influence the study's findings, the disparities are still present but not statistically significant within the parameters of the research framework (Cetinkaya-Rundel and Hardin 2021).

Bakare et al. (2023) state that silage DM loss can range from 5 to 15% due to a number of problems, such as inadequate fermentation, plastic cover permeability, undesired microbial contamination, incorrect handling, uncontrolled temperature, water contamination, or excessive acid production. According to Dryden (2021), the nutritional value of the silage produced decreases with increasing dry matter loss. In order to reduce dry matter loss and guarantee that the silage generated has a good nutritional value for cattle consumption, it is crucial to carefully control the silage-making process.

Conclusion

In silage produced from odot grass and fine rice bran, the addition of commercial rejected syrup can raise the generation of lactic acid, lower pH, and lower ammonia concentration, all of which point to more ideal fermentation outcomes. The intricate relationships between nutrient composition, microbial activity, and environmental conditions throughout the ensilage process, however, may have contributed to the difference in total VFA between treatments. However, there was no discernible difference in dry matter loss between treatments that received more commercially rejected syrup. Since it can lower ammonia levels and raise the overall VFA value of silage prepared from odot grass and fine rice bran, using commercial rejected syrup with 10% DM (P3) is generally advised.

Acknowledgement

The authors would like to express their gratitude to everyone who aided and encouraged this research up until the article's release.

References

1. **Abrar A, Fariani A and Fatonah 2019** Effect of plant part proportion on physical quality of elephant grass (*Pennisetum purpureum*) silage. Sriwijaya Animal Husbandry Journal, 8(1): 21-27. https://doi.org/10.33230/JPS.8.1.2019.9379.
2. **Alifia I and Hartutik AI 2018** Effect of pollard and bran addition in making elephant grass (*Pennisetum purpureum*, cv. Mott) silage on digestibility and gas production in vitro. Journal of Tropical Animal Nutrition, 1(1): 9-17. https://doi.org/10.21776/ub.jnt.2018.001.01.2.
3. **Bakare AG, Zindovem TJ, Bhavna A, Devi A, Takayawa SL, Sharma AC and Iji PA 2023** *Lactobacillus buchneri* and molasses can alter the physicochemical properties of cassava leaf silage. Heliyon, 9: e22141. https://doi.org/10.1016/j.heliyon.2023.e22141.
4. **Bartosik R, Urcola H, Cardoso L, Maciel G and Busato P 2023** Silo-bag system for storage of grains, seeds and by-products: A review and research agenda. Journal of Stored Products Research, 100: 102061. https://doi.org/10.1016/j.jspr.2022.102061.
5. **Bernardes TF, JRS Gervásio, G De Morais and DR Casagrande 2019** Technical note: A comparison of methods to determine pH in silages. Journal of Dairy Science, 102(10): 9039-9042. https://doi.org/10.3168/jds.2019-16553.
6. **Borreani G, Tabacco E, Schmidt R J, Holmes B J and Muck R E 2017** Silage review: Factors affecting dry matter and quality losses in silages. Journal of Dairy Science, 101(5): 3952-3979.

https://doi.org/10.3168/jds.2017-13837.
7. **Cetinkaya-Rundel M and Hardin J 2021** Introduction to Modern Statistics. 1st Ed. New York: Openintro Publishing.
8. **Chalisty VD 2021** Effect of addition of molasses, *Lactobacillus plantarum, Trichoderma viride*, and their mixtures on the chemical composition of total silage of forage mixture. Journal of Nusantara Animal Science, 1(01): 29–36. https://doi.org/10.53863/jspn.v1i01.187.
9. **Conway EJ 1948** Microdiffusion Analysis and Volumetric Error. Nature Publishing Group 161, 583. https://doi.org/10.1038/161583a0.
10. **Dryden GM 2021** Fundamentals of Applied Animal Nutrition. England: CABI Press.
11. **Esen S, Koç F and Işık R 2024** Effect of sodium diacetate on fermentation, aerobic stability, and microbial diversity of alfalfa silage. 3: 14-10. https://doi.org/10.1007/s13205-023-03853-z.
12. **Gomes ALM, Jacovaci FA, Bolson DC, Nussio LG, Jobim CC and Daniel JLP 2019** Effects of light wilting and heterolactic inoculant on the formation of volatile organic compounds, fermentative losses and aerobic stability of oat silage. Anim Feed Sci Technol, 247:194–198. https://doi.org/10.1016/j.anifeedsci.2018.11.016.
13. **Guamán SA, Albanell E, Ajenjo O, Casals R, Elhadi A, Salama AAK and Caja G 2023** Performances and nutritional values of a new hooded barley (cv. Mochona) and a high yield triticale (cv. Titania) as hay or silage for sheep under Mediterranean conditions. Animal Feed Science and Technology, 305: 115784, https://doi.org/10.1016/j.anifeedsci.2023.115784.
14. **Hedayatullah M and Zaman P 2019** Forage Crops of The World Volume II: Minor Forage Crops. Canada: Apple Academic Press.
15. **Hynd PI 2019** Animal Nutrition from Theory to Practice. CABI Publishers.
16. **Irawan A, Sofyan A, Ridwan R, Hassim HA, Respati AN, Wardani WW, Sadarman, Astuti WD and Jayanegara A 2021** Effects of different lactic acid bacteria groups and fibrolytic enzymes as additives on silage quality: A meta-analysis. Bioresour Technol Reports, 14:100654. https://doi.org/10.1016/j.biteb.2021.100654.
17. **Jayanegara A, Ridla M, Astuti DA, Wiryawan KG, Laconi EB and Nahrowi 2017** Determination of energy and protein requirements of sheep in Indonesia using a meta-analytical approach. Tropical Animal Science Journal, 40(2): 118–127. https://doi.org/10.5398/medpet.2017.40.2.118.
18. **Katoch R 2023** Techniques in Forage Quality Analysis. Springer. Singapore.
19. **Kondo M, Shimizu K, Jayanegara A, Mishima T, Matsui H, Karita S, Goto M and Fujihara T 2016** Changes in nutrient composition and in vitro ruminal fermentation of total mixed ratio silage stored at different temperatures and periods. Journal of Science Food Agriculture, 96(4):1175–1180. https://doi.org/10.1002/jsfa.7200.
20. **Kung Jr L, Shaver RD, Grant RJ and Schmidt RJ 2018** Silage review: Interpretation of chemical, microbial, and organoleptic components of silages. Journal of Dairy Science, 101(5): 4020–4033. https://doi.org/10.3168/jds.2017-13909.
21. **McDonald P, R Edwards, J Greenhalgh, C Morgan, L Sinclair and R Wilkinson 2022** Animal Nutrition, 8th Ed. Pearson Ltd. Singapore.
22. **Minson DJ 2012** Forage in Ruminant Nutrition. Australia: Academic Press Inc.
23. **Muck RE 2018** Silage review: Recent advances and future uses of silage additives. Journal of Dairy Science, 101(5): 3980–4000. https://doi.org/10.3168/jds.2017-13839.
24. **Olijhoek DW, Lamminen M, Hellwing ALF, Larsen M, Weisbjerg MR, Bach Knudsen KE and Lund P 2023** Effect of substituting maize silage with fresh or ensiled sugar beets on nutrient digestibility, rumen fermentation and microbial synthesis, and enteric methane emission in dairy cows. Animal Feed Science and Technology, 303: 115715. https://doi.org/10.1016/j.anifeedsci.2023.115715.
25. **Sadarman, Ridla M, Nahrowi, Ridwan R, Harahap RP, Nurfitriani RA and Jayanegara A 2019** Physical quality of soy sauce dregs silage with Acacia tannin additive (Acacia mangium Wild.) and other additives. Journal Animal Husbandry, 16(2): 66. http://dx.doi.org/10.24014/jupet.v16i2.7418.
26. **Sadarman, Febrina D, Wahyono T, Mulianda R, Qomariyah N, Nurfitriani RA, Khairi F, Desraini S, Zulkarnain, Prasetyo AB and Adli DN 2022** Physical quality of elephant grass silage and fresh tofu dregs with the addition of rejected commercial syrup. Journal of Nutrition Science and Feed Technology, 20: 73-77. https://doi.org/10.29244/jintp.20.2.73-77.
27. **Sadarman, Handoko J, Febrina D, Febriyanti R, Purba RA, Ramadhan ES, Qomariyah N, Gholib, Nurfitriani RA, Adli DN and Khairi F 2023** Evaluation of the use of a combination of molasses-based additives and commercial syrup that can stimulate good microbial growth on the fermentation profile of corn stalk silage. Journal of Tropical Animal Nutrition, 6(1): 57-68. https://doi.org/10.21776/ub.jnt.2023.006.01.7.
28. **Sadarman, Febrina D, Qomariyah N, Mulia FF, Ramayanti R, Rinaldi ST, Putri TR, Adli DN, Nurfitriani RA, Haq MS, Handoko J and Putera AKS 2023** The effect of adding molasses as a source of glucose on the physicochemical characteristics of elephant grass silage. Journal of Nutrition Science and Feed Technology, 21(1): 1-7. https://doi.org/10.29244/jintp.21.1.1-7.

29. **Sadarman, Febrina D, Rinaldi S T, Hendri, Ilyazar M I, Weno, Alfian A, Nurfitriani RA, Qomariyah N, Sukmara A, Koswara E, Prihambodo TR, Gholib and Azmi A F M 2023** The quality of organic waste market sensitized using rejected commercial syrup as an alternative ruminant livestock feed. Animal Production: Indonesian Journal of Animal Production, 25(3): 186-198. https://doi.org/10.20884/1.jap.2023.25.3.257.
30. **Sadarman, Juliantoni J, Febrina D, Prastyo A B, Fazly M and Qomariyah N 2024** Silage transformation: The latest profile of odot grass (pennisetum purpureum cv mott) and rice bran with the use of rejected syrup. Journal of Tropical Animal Nutrition, 7 (1) 58-67. https://doi.org/10.21776/ub.jnt.2024.007.01.7.
31. **Sandi S and Desiarni M A 2019** Beef cattle feed management in community farms in Sejaro Sakti Village, Indralaya District, Ogan Ilir Regency. Sriwijaya Animal Husbandry Journal, 7(1): 21–29. https://doi.org/10.33230/JPS.7.1.2018.7080.
32. **Sujarweni V and Utami L R 2023** The Guidebook of SPSS. Jakarta: Anak Hebat Indonesia.
33. **Utomo R 2021** Conservation of Green Forage. Yogyakarta: UGM Press.
34. **Wahyudi A 2019** Silage: Fermented Green Forage and Complete Ruminant Feed. UMM Press. Malang.
35. **Wati W S, Mashudi M and Irsyammawati A 2018** Silage quality of Odot grass (Pennisetum purpureum Cv.Mott) with the addition of Lactobacillus plantarum and molasses at different incubation times. Journal of Tropical Animal Nutrition, 1(1): 45–53. https://doi.org/10.21776/ub.jnt.2018.001.01.6.