
EFFECT OF EM4 USE WITH DIFFERENT LEVELS ON PHYSICAL QUALITY OF ELEPHANT GRASS SILAGE

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Abstract

This research aims to determine the effect of the use of EM4 with different levels on the physical quality of elephant grass silage. The method used was a complete random design (CRD). The treatment consisted of 5 treatments with three replicates, namely P0: EM4 0%; P1: EM4 5%; P2: EM4 10%; P3: EM4 15% and P4: EM4: 20%. The parameters observed were physical quality (color, smell, texture, mold) and pH. The results showed that the difference in EM4 use levels had no real effect ($P>0.05$) on smell but had a real effect ($P<0.05$) on color, texture, mold and pH. The treatment that provides the best physical quality is the P2 treatment with an EM4 level of 10%.

Keywords: Elephant grass, EM4, Physical quality, Silage

INTRODUCTION

The determining factor for the success of increasing livestock productivity includes the availability of quality feed in a sustainable manner. The problem that farmers always face is the fluctuating availability of feed. In the rainy season, forage is abundantly available, but in the dry season the availability of feed is limited. Feed plays a role of 60-70% in the success of the livestock business. Quality forage feed is crucial for ruminant livestock. Forage for Elephant grass (*Pennisetum purpureum* cv. King) is preferred by ruminant livestock. Ella (2002) reported that Elephant grass has a crude protein (PK) nutrient content of 7-13%, digestibility value of 55-70%, drought resistance, high productivity, so it is widely grown by farmers. Elephant grass productivity reaches 40 tons/ha to 80 tons/ha in subtropical areas (Woodard & Prine, 1993). In the dry season, forage production tends to be low, this is due to the limited availability of water. Greenery preservation strategies.

Feed is the most important component, feed costs hold the highest percentage in production costs, which is 60-70%. According to Yuli Retnani (2013) The provision of quality feed can increase the livestock population, the production of meat, milk, and eggs as livestock products. In addition to producing quality feed, low prices are also needed in the manufacture of animal feed. The feed ingredients that make up the general poultry ration or commercial poultry rations on the market, approximately 90-95% are composed of plants or plants. The high and low use of plant-based feed ingredients in the preparation of poultry rations is closely related to the price and nutritional content of the rations made.

Factors that affect the quality of silage in general are material maturity and moisture content, material particle size, storage during ensilage and additives (Bolsen *et al.*, 2000). Other factors that can affect the quality of silage are: material characteristics (forage used, additives and moisture content of the material in the forage because the moisture content will encourage fungal growth and

produce butyric acid), silage manufacturing procedures (particle size, filling speed to the silo, packing density and silo sealing), non-dense packing can reduce ineffectiveness in the use of silage, and climatic conditions (temperature and humidity) (Adesogan, 2006). The most commonly used additive in the manufacture of silage is EM4. The level of EM4 addition in silage greatly affects the quality of silage. Therefore, it is important to know the exact level of EM4 in the manufacture of silage.

LITERATURE REVIEW

Fermentation is all kinds of metabolic processes with the help of enzymes from microbes (digested bodies) to carry out oxidation, reduction, hydrolysis and other chemical reactions so that there are chemical changes in an organic substrate by producing certain products and causing changes in the properties of the material, Suningsih *et al.* (2019).

Silage is forage that is stored in a fresh state, in a place called a silo. Silos are a place to store livestock feed (forage) both made in the ground and on the ground. Silage is a fermentation process with the intention of preserving forage in a wet (damp) state. Things that can cause silage damage are forage compaction in less than perfect silos and imperfect silo closure (Komar, 2014).

The ensilage process occurs when oxygen has been used up, plant respiration will stop and the atmosphere becomes anaerobic, so that this situation does not allow the growth of fungi and only anaerobic bacteria are still active, especially acid-forming bacteria, (Hasanah *et al.*, 2022).

The process of making silage (ensilage) will run optimally if an accelerator is added during the ensilage process. Accelerators can be in the form of an inoculum, lactic acid bacteria, or easily soluble carbohydrates. The function of adding accelerators is to add dry materials to reduce the moisture content of silage, create an acidic atmosphere in the silage, accelerate the ensilage process, inhibit the growth of decaying bacteria and fungi, stimulate the production of lactic acid and to increase the nutrient content of silage (Komar, 2014).

EM4 is an inoculum that can be used in the fermentation process. EM4 has a great influence on the decomposition of substances that will make the fermented material more quality (Taufik, 2014). Effective Microorganisms - 4 (EM4) are microbial bacteria resulting from the fermentation of the change of glucose substances into bacteria, or bacteria made from substances containing glucose. EM4 is a type of solution that contains bacteria including decomposer, *Lactobacillus* sp, lactic acid bacteria, photosynthetic bacteria, Streptomyces, cellulose-degrading fungi, phosphorus solvent bacteria that function as natural decomposers of organic matter (Akmal, 2004).

RESEARCH METHOD

This research was conducted at the Teaching Farm of the Department of Animal Husbandry, Pangkep State Agricultural Polytechnic, Pangkep Regency. The materials used in this study are 15 kg elephant grass forage, 3% molasses, 5% bran, enough water and EM4 according to the treatment. This study consisted of 5 treatments with 3 replicates using a complete randomized design (CRD) with the following treatment arrangements:

- P0: EM4 0%;
- P1: EM4 5%;
- P2: EM4 10%;
- P3: EM4 15% dan
- P4: EM4: 20%.

Elephant grass is chopped to a size of 3-5 cm. After that, each was mixed with 5% bran, 3% molasses and given an EM4 level according to the treatment. After mixing and homogeneously, it is put into jars until it is solid, then fermented for 21 days. Furthermore, observations were made on color, aroma, texture parameters, inspection of fungal contamination and pH checking.

The physical quality test was carried out by the panelist test method using 10 people. The panelists used were livestock students who already understood the quality characteristics of silage products. pH measurement uses a pH meter while other parameters are tested based on fermentation scoring standards according to table 1.

Tabel 1 Fermentation scoring standards

Parameters	Characteristic	Score
Colur	Blackish brown	1-3
	Brownish yellow	4-6
	Boiled leaf green	7-9
Smell	Rotten	1-3
	Medium sour	4-6
	Strong sour	7-9
Texture	Soft	1-3
	Medium	4-6
	Not easily broken	7-9
Mold	Many (>50%)	1-3
	Few (1-49%)	4-6
	None (0%)	7-9

Caption: Score criteria: 1-3 is not good, 4-6 is quite good, 7-9 is good
Source: Mc Ellhiney (1994).

The data obtained was analyzed using a variety fingerprint or analysis of variance calculation (ANOVA). All data analysis uses the SPSS version 24 application. If the results of the fingerprint analysis show a real influence, a further test is carried out by Duncan's Multiple Range Test (DMRT).

RESULTS AND DISCUSSION

The physical quality and pH value of elephant grass silage with the use of EM4 at different levels are presented in Table 2.

Table 2 Physical quality and pH value of elephant grass silage with the use of EM4 at

Parameters	Parameters				
	P0	P1	P2	P3	P4
pH	6,00±0,01 ^c	5,53±0,21 ^b	4,08±0,14 ^a	5,33±0,14 ^b	4,08±0,14 ^a
Colur	8,33±0,01 ^c	4,67±0,38 ^a	7,28±0,86 ^b	7,83±0,58 ^{bc}	7,89±0,19 ^{bc}
Smell	6,22±1,39	5,39±0,24	6,17±0,29	4,83±0,29	5,33±0,57
Texture	7,22±0,19 ^b	8,17±0,28 ^b	8,11±0,19 ^b	4,33±0,58 ^a	7,22±1,07 ^b
Mold	4,45±0,39 ^b	5,22±0,46 ^c	6,00±0,00 ^d	2,17±0,58 ^a	5,17±0,29 ^c

different levels

Caption: Different superscripts on the same line show a real influence ($P < 0.05$). EM4 usage level (P0: EM4 0%; P1: EM4 5%; P1: EM4 10%; P2: EM4 15%; P3: EM4 20%)

Based on Table 2, the variety analysis showed that the treatment of EM4 level differences in elephant grass silage had no effect ($P>0.05$) on silage odor, but had a real effect ($P<0.05$) on pH, color, texture and mold. The results of further tests using duncan were found that the P2 treatment showed the best results.

P2 treatment using EM4 at the level of 15% showed the lowest pH, which was 4.08. Silage can be said to be good if it has a value range of 3.8-4.2. Silage quality can be classified into four categories: excellent (pH 3.8-4.2), good (pH 4.3-4.5), medium (pH 4.5-4.8) and poor (pH>4.8) (Doelle, Rokem, & Berovic., 2009). The best score values on the best color and texture parameters on the P2 treatment. This shows that the ensilage process is sufficient with the addition of 15% EM4. The color produced in the P2 treatment with a score of 7.28 was green of boiled leaves. The resulting color shows the maximum score because it still retains the original color of the forage. The best texture was shown in the P1 and P2 treatments with scores of 8.17 and 8.11. The resulting silage texture is not easily destroyed. The texture is not easily crumbled showing good silage quality. The change in color and texture of the substrate changes during the fermentation process due to the anaerobic respiration process.

The best silage based on fungal parameters is in the P2 treatment. The highest score in the P2 treatment was 6 with little fungus. Meanwhile, other treatments have low scores that show more fungi than P2 treatments. The mold found in the P2 treatment is only on the upper surface of the container. The results of the research of Kushartono and Iriani (2005), stated that the fungal contamination that occurred was only found on the upper surface of the jar, while the inside part did not contain mold. This may be because the surface is more easily in contact with the outside air than the inside. The mushrooms found in the sample are white mushrooms, white mushrooms have non-toxic properties. In contrast to mushrooms that are red and greenish, this type has destructive and toxic properties (Yulianto & Saparinto, 2011).

Lactic acid bacteria are naturally present in plants so they can automatically play a role during fermentation, but to optimize the ensilage phase it is recommended to add additives such as lactic acid bacteria inoculum and other additives to ensure a perfect lactic acid fermentation. The inoculum of lactic acid bacteria is an additive, enzyme and source of carbohydrates. This silage inoculum can also be used as a probiotic because of its ability to survive until the main stomach of ruminants (Weinberg *et al.*, 2004).

CONCLUSION

The conclusion of this study is that the treatment that provides the best physical quality in elephant grass silage is P2 treatment with an EM4 level of 10%.

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