**Enhancement the Quality of Ramie Leaves Silage (*Boehmeria nivea* L. Gaud) with Probiotic Starter During Aerobic Exposure and Palatability Levels in Sheep (*Ovis aries*)**

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**Novelty Statement**

Ramie is a potential source of biomass as a raw material for making silage because it has a high crude protein content of up to 16.35%. Silage production is a strategy to overcome limited forage, especially during the dry season. The development of Ramie-based silage products with the addition of the probiotic starter has been proven to increase aerobic stability and silage quality.

**ABSTRACT**

The addition of a probiotic starter in silage production will improve fermentation quality, aerobic stability, and potential animal performance. This research was conducted to determine the effect of aerobic exposure and re-ensiling on silage quality and palatability levels in sheep. Treatment consisted of control (ramie leaves + 3% molasses); P1 (ramie leaves + probiotic starter with rice bran 3%); and P2 (ramie leaves + Probiotic starter with heriyaki powder 3%). The parameters observed were physical parameters (texture, color, aroma, presence of mold), chemical parameters (pH), microbiological parameters (microbial counts), and palatability level. The best-quality silage was tested to be made in pellet form. The research results showed that the addition of the Probiotic starter with heriyaki powder additive produced the best physical and chemical silage quality and had better aerobic stability compared to other treatments. The palatability level of sheep for Probiotic starter with heriyaki powder silage was 28.07% higher compared to standard feed. The results of this research can be applied in the livestock sector to produce high-protein ration products, especially for ruminant feed, and are green technology.

**Keywords:** Aerobic Exposure; Palatability; Ramie leaves; Re-ensiling; Silage.

**Introduction**

Ramie (*Boehmeria nivea*) is a potential biomass source as a raw material for ruminant animal feed because it has a high protein content of around 179–211 g/kg dry weight (Tian *et al*. 2022) and is rich in antioxidants such as polyphenols and flavonoids (Tang *et al*. 2021). These leaves provide the main macronutrient elements needed as forage and contain 16.35% crude protein, 6.36% crude fat, and 13.61% crude fiber (Despal *et al*. 2011 in Suryanah *et al*. 2018). Apart from that, ramie plants are quite easy to cultivate; they can be planted in monoculture or mixed cropping with other plants (Rehman *et al*. 2019). According to Rifdah (2020), ramie plants produce 125 tons per hectare per year, consisting of 40% green leaves (50 tons) and 60% wet stems (75 tons). This large amount of production requires preservation to maintain the nutrients in it. One method of preservation that can be done is by making silage.

Silage is animal feed from agricultural products that is stored through a fermentation and acidification process (Grant & Adesogan, 2018). Silage is generally made from forage and agricultural waste, which has a water content of 60–70%, through a lactic acid fermentation process that takes place anaerobically in a silo (Banu *et al*. 2019). Probiotic starters are used in the silage production process to improve fermentation quality, aerobic stability, and potential animal performance (Muck *et al*. 2018). The ensiling process involving LAB such as *Lactobacillus, Bifidobacterium, Saccharomyces, Streptococcus, Enterococcus, Escherichia*, and *Bacillus* (Kaashyap *et al*. 2021) is known to be able to improve the quality of fermentation and preserve forage nutrients, thereby producing silage as feed with high nutritional value (Li *et al*. 2022).

Through the ensiling process, forage can be stored, and the harvesting process does not depend on the weather. This research was carried out by adding a new probiotic starter that had never been used before. Thus, the aim of this study was to determine the effect of aerobic and re-ensiling exposure from the addition of the probiotic on silage quality and palatability levels in sheep. The resulting data can be used as a source for the latest formulation of animal feed silage starter.

**Materials and Methods**

**Experimental details and treatments**

**Experimental material:** The research was carried out at the Center of Development Ramie (CDR) Laboratory, Center for Bioprospecting Studies on Natural Fibers and Biological Resources, Padjadjaran University, Bandung, during June–December 2023. Ramie leaves were obtained from ramie plantations owned by PT. Rajantara, located in Pajagan Village, Cisitu District, Sumedang, West Java. The ramie leaves used in this research were approximately 2 months old. The leaves are air-dried at room temperature for 2 days until the water content decreases to 60–70%. The dried leaves are then cut into 3-cm pieces. The additives used were molasses and probiotic starter with addition of rice bran and Heriyaki Powder, which had been made in previous research.

**Treatments:** The treatment composition consisted of Control (ramie leaves + molasses); P1 (ramie leaves + Probiotic starter with rice bran); and P2 (ramie leaves + Probiotic starter with heriyaki powder). The silage is made in a size of 200 grams with the addition of 35 mL of additives at a dose of 3%. The silage was fermented anaerobically in polyethylene plastic measuring 12 x 25 cm at room temperature (25–27 °C) for 14 days. Aerobic stability testing was carried out by exposing the fermented silage to oxygen for 3 days. The silage was placed in polyethylene plastic, which had 24 random holes (0.5 cm) in the plastic. The re-ensiling test is carried out by vacuuming the silage again, which has been given aerobic exposure. The re-ensiling silage is fermented again for 3 days.

**Silage Making**

The dried ramie leaves were cut into 3 cm pieces and then weighed 200 grams. Molasses additives, Probiotic starter with rice bran and Probiotic starter with heriyaki powder, with a dose of 3% were added to 35 mL by spraying evenly using a sprayer. Ramie leaves were put in polyethylene plastic, vacuumed using a vacuum sealer (SINBO DZ-280/SE), and fermented for 14 days (Yunianta and Hartati, 2015).

**Pellets Making**

Ramie leaves silage fermented by Probiotic starter with heriyaki powder is made into pellets because it shows the best physical and chemical quality results. The ramie leaves silage was ground using a blender for 1 minute. Molasses is added to as much as 5% of the weight of the silage as an adhesive. The silage is then fed into a molding machine to produce cylindrical silage pellets with a diameter of ± 8 mm. The silage is then dried to reduce the water content. The finished silage pellets were observed in cross-section and longitudinal cross-section macroscopically and microscopically. The data obtained is explained descriptively.

**Chemical Quality Analysis**

A total of 20 grams of silage was mixed with 180 mL of distilled water and ground with a blender for 1 minute, then filtered through filter paper. The pH of the filtrate was measured with an ATC pH meter (backlight pH-2011). The pH value is recorded after the display shows a stable number (Xu *et al.* 2019). The silage quality categories based on pH can be seen in Table 1.

**Physical Quality Analysis**

The physical quality of the silage is analyzed through organoleptic tests with several parameters, including color, aroma, texture, and the presence of mold. The percentage of fungal presence was calculated by separating the damaged silage and weighing it. The surface appearance of ramie leaves was observed using a microscope. The scoring used is based on the assessment method according to Utomo *et al*. (2016) which can be seen in Table 2.

**Microbiology Analysis**

Microbiological analysis was carried out by observing the macroscopic morphology of silage microbes. Bacterial isolation was carried out by grinding 10 grams of silage in 90 mL of distilled water and then filtering the solution using filter paper. Graded dilutions were carried out using 0.9% physiological NaCl. Microbial cultures were made on NA (nutrient agar) media. Microbial counts were carried out using the total plate count method after incubation at 30 °C for 2 days (Cai *et al.* 2020). TPC data were analyzed descriptively. Bacterial isolates were then subjected to gram staining for identification.

**Palatability Test**

The best quality silage was physically and chemically tested for palatability on five garut sheep (*Ovis aries)* using the cafeteria method (Christi, 2019)*.* The palatability test was carried out by comparing ramie leaf silage with standard feed usually consumed by test animals, namely bandotan grass with a crude protein content of 15.67%, crude fiber of 18.24%, and crude fat of 5.67% (Agunbiade *et al*. 2012). Adjustments were made to the test animals first for 3 days (Suryaningsih, 2019) and palatability data collection was carried out over a period of 5 days (Purwin *et al*. 2022). Each sheep was given an individual pen and given drinking water ad libitum. The amount of feed given based on the dry weight of the silage is 3% of the sheep's body weight (Kyambu *et al*. 2021) with feeding carried out twice every day, namely at 08.30 and 14.30. The level of palatability is known by calculating the average feed consumption.

**Statistical Analysis**

Statistical analysis was carried out using IBM SPSS Statistics 24 software. Data results in the form of pH values were analyzed using ANOVA and Duncan's advanced test. Statistical analysis of organoleptic tests was carried out using the Kruskal-Wallis and Mann-Whitney U advanced tests. The results of the palatability test data in the form of average feed consumption were analyzed statistically using the T-dependent test.

**Results**

**Chemical Quality**

The degree of acidity (pH) of silage showed significant differences (P<0.05) in each treatment (Table 3). The lowest pH value of silage fermented for 14 days was with the addition of the Probiotic starter with heriyaki powder additive, while the highest pH value was control silage. Based on the silage quality category, according to Rusdi *et al*. (2021), silage that has been fermented for 14 days is included in the medium quality category, namely with a pH range of 4.5-4.8. After the silage was given aerobic exposure for 3 days, the pH value increased to 7.10. All silage with aerobic exposure is included in the poor quality category with a pH range of >4.8. Meanwhile, after re-ensiling, the silage experienced a decrease in pH value to 5.21.

**Physical Quality**

Ramie leaf silage with a fermentation time of 14 days showed no significant difference (P>0.05) in color to the control silage with the addition of molasses and Probiotic starter with rice bran , but showed a significant difference (P<0.05) in the silage with the addition of Probiotic starter with heriyaki powder (Table 4). Based on aroma, there was a significant difference (P<0.05) in the control silage, but there was no significant difference (P>0.05) in the silage with the addition of Probiotic starter with rice bran and Probiotic starter with heriyaki powder. Based on texture, there was no significant difference (P>0.05) in all silages. The control silage has a dark green color, a sweet, slightly sour smell and a firm, non-slimy texture. Probiotic starter with rice bran and Probiotic starter with heriyaki powder silage has a dark green color, a fragrant sour aroma and a slightly hard texture that is not slimy. All silage that has been fermented for 14 days is free from mold.

Silage with aerobic exposure experienced a decrease in physical quality, especially in control silage, which showed significant differences (P<0.05) based on color and aroma parameters but did not show significant differences (P>0.05) based on texture parameters. The control silage has a brownish color, a stimulating aroma, and a slightly firm texture that is not slimy. Silage with the addition of Probiotic starter with rice bran and Probiotic starter with heriyaki powder has a dark green color, a sweet, slightly sour aroma, and a firm, non-slimy texture. The presence of fungi after aerobic exposure was observed in control silage (29.94%) and Probiotic starter with rice bran silage (7.32%). Meanwhile, Probiotic starter with heriyaki powder silage does not contain mold. Silage after re-ensiling showed no significant differences (P > 0.05) in each treatment. The control silage has a brownish color, a sweet, slightly sour aroma, and a slightly firm, non-slimy texture. Probiotic starter with rice bran and Probiotic starter with heriyaki powder silage have a dark green color, a sweet, slightly sour aroma, and a slightly hard texture that is not slimy.

A comparison of the surfaces of ramie leaves before and after fermentation is shown in Table 5. Through microscopic morphological analysis, there is a clear difference between silage that has been fermented for 14 days and fresh leaves. Fresh ramie leaves have a bright green color with white leaf veins, in contrast to the silage group, which looks more brownish and has dark leaf veins. This occurs because of the oxidation reaction that occurs during fermentation. Apart from that, the three silage groups were also compared in terms of morphology and showed differences between the three. The control silage had a dark-colored leaf cell morphology similar to the silage with the addition of probiotic starter with heriyaki powder, but different from the silage with the addition of probiotic starter with rice bran , which was light green in color.

**Microbiology Analysis**

The results of gram staining of microbial isolates in silage fermented for 14 days are shown in Table 6. From the table, a total of six bacterial isolates were obtained in the silage samples. The bacterial isolates obtained came from a group of gram-positive bacteria in the form of bacilli and cocci. The results of silage microbial calculations at a dilution factor of 10-6 are shown in Table 7.

**Palatability Level**

The results of the level of palatability of Probiotic starter with heriyaki powder silage in arrowroot sheep during the five-day testing period can be seen in Table 8. The results of the T-dependent test show a significant difference (P<0.05) in the level of palatability between standard bandotan grass feed and Probiotic starter with heriyaki powder silage. The amount of standard feed consumed is lower (547.4 grams/day) compared to ramie leaf silage (701.1 grams/day). This value shows that the amount of sheep consumption of ramie leaf silage is 28.07% higher than standard feed.

**Probiotic starter with heriyaki powder Silage Pellets**

The previously-made Probiotic starter with heriyaki powder silage is further processed into pellets through a compaction and molding process. Processing into pellets aims to increase the shelf life of silage. Silage made from pellets can last longer than regular silage because the lower water content inhibits spoilage by spoilage microbes, which affects the quality of the silage. The results of the level of palatability of Probiotic starter with heriyaki powder silage in arrowroot sheep.

The resulting silage pellets have a dark brown appearance with a length of ± 25 mm and a diameter of ± 8 mm. Silage made from pellets has a darker color than wet silage because it has gone through a process of reducing the water content and adding molasses as an adhesive. The addition of 15% (w/w) molasses makes the resulting pellets dense and not easily crushed into flakes. Silage pellets have a solid shape seen from a microscope. The dense form of silage pellets can maintain anaerobic conditions in the silage, so feed preservation is guaranteed.

**Discussions**

* 1. Chemical Quality

The pH value of silage decreases after the fermentation process because during the fermentation process lactic acid bacteria produce lactic acid. The addition of the Probiotic starter with heriyaki powder additive produces the lowest pH value compared to other treatments. The addition of probiotics can reduce the pH of the silage due to the number of lactic acid bacteria in the silage so that the fermentation process takes place more quickly (Xu *et al*. 2019). After 3 days of aerobic exposure, the pH value of the silage increased, but the silage with the addition of Probiotic starter with rice bran and Probiotic starter with heriyaki powder additives maintained a lower pH than the control silage. The increase in pH after aerobic exposure is caused by the yeast's organic acid metabolism pathway, starting with silage oxygenation, which can reduce the concentration of lactic acid and increase the pH (Hu *et al*. 2020). After re-ensiling, the pH value of the silage decreased. The decrease in pH was caused by a re-increase in the number of lactic acid bacteria; this is in line with research of Yin *et al*. (2021) where napier grass re-ensiling silage experienced an increase in *Lactobacillus*, reaching 94.8%.

* 1. Physical Quality

The physical quality of the silage fermented for 14 days showed good quality, characterized by a dark green color, a sour aroma, and a slightly hard, non-slimy texture. After fermentation, the color of the leaves changes to become darker. The final color of the silage is determined by the type of forage used (Tahuk *et al*. 2020). The color change in silage is influenced by the Maillard reaction that occurs during the fermentation process (Kung *et al*. 2018).

The overall aroma of the silage produced in this study was slightly sour and sweet. The soft, sour aroma is caused by the production of acetic acid by heterofermentative lactic acid bacteria, which ferment hexoses into lactic acid and other products such as acetic acid and ethanol, which can react with the acid in the silage to produce esters, thereby adding a fruity aroma (Kung *et al*. 2018). In this study, all silage produced a slightly hard texture and was not slimy. Silage with a high water content (>80%) will show a slimy and soft texture, while silage with a low water content (<30%) will have a dry texture (Tahuk *et al*. 2020). Apart from that, the texture of silage is also influenced by the fiber source used as silage material (Trisnadewi & Cakra, 2020). Based on the results of proximate analysis, the crude fiber content in ramie leaves is 38.31%. The high fiber content in ramie leaves produces silage with a slightly hard texture.

After aerobic exposure for 3 days, fungal growth was observed on the outer surface of the silage, which was exposed to air. This is because the yeast's organic acid metabolism pathway begins with silage oxygenation, which can reduce the concentration of lactic acid and increase the pH (Hu *et al*. 2020). The ensiled material is an excellent substrate for fungal growth when exposed to air (González-Jartín *et al*. 2022). Fungal spoilage in silage is associated with loss of nutrients and dry matter, decreased palatability, mycotoxin production, and decreased feed intake (Rodríguez-Blanco *et al*. 2021). Most mycotoxins are produced by the genera *Aspergillus, Fusarium, Alternaria*, and *Penicillium* (Ogunade *et al*. 2018).

In terms of appearance, the three silage samples show differences in leaf morphology when observed microscopically. The control silage had a dark-colored leaf cell morphology similar to the silage with the addition of probiotic starter with heriyaki powder, but different from the silage with the addition of probiotic starter with rice bran , which was light green in color. The change in silage color to brown is caused by fermentation activity, which produces heat due to the oxidation reaction of the breakdown of sugar compounds by microbes.

* 1. Microbiology Analysis

The bacteria found in silage are generally a group of lactic acid bacteria (LAB), which produce organic acid products during the fermentation process, such as lactic acid, acetic acid, propionic acid, and butyric acid (Hisham *et al*. 2022). Lactic acid bacteria will form milky white or cream-colored colonies that are circular in shape with intact edges and convex elevations (Ary *et al*. 2021). Through microscopic morphological analysis of the isolates accompanied by gram staining, the bacteria found in the silage samples were gram-positive bacilli and cocci from the LAB group, thought to be from the genus *Lactobacillus* and *Lactococcus*.

The results of microbial calculations show that the bacterial composition in silage is more dominant than that of fungi or yeast. Probiotic starter with Heriyaki Powder silage produces a greater number of fungi and bacteria than other treatments. The effectiveness of silage inoculants can vary depending on the type of inoculant. Not all LAB strains can be used as silage inoculants (Muck *et al*. 2018). Certain LAB strains that can survive ensiling conditions and reduce pH quickly are needed for silage production. The ensilage process involving lactic acid bacteria (LAB) such as *Lactobacillus*, *Bifidobacterium*, *Saccharomyces*, *Streptococcus*, *Enterococcus*, *Escherichia* and *Bacillus* (Kaashyap *et al*. 2021) is known to be able to improve the quality of fermentation and preserve forage nutrients, thereby producing silage as feed with high nutritional value (Li *et al*. 2022).

* 1. Palatability Level

The palatability level of sheep is higher in ramie leaf silage compared to standard feed in the form of ordinary grass without fermentation because the silage contains lactic acid, which produces a distinctive aroma and simple sugar products (Christi, 2019) thus providing a sweet taste that is preferred by livestock. This is in accordance with the statement of Van Soest (1994) inSiqueira *et al*. (2022)which states that ruminants choose feed based on taste and color. Apart from that, the level of palatability is also influenced by factors of the animal itself, such as species or breed, organoleptic senses, individual differences, and habituation to the feed (Kenana *et al*. 2020).

E. Probiotic starter with heriyaki powder Silage Pellets

Making feed in pellet form is a way of preserving feed ingredients that is more guaranteed to maintain feed quality and extend the shelf life of silage by maintaining anaerobic conditions. Making silage in pellet form can be an alternative to reducing the reduction in silage quality caused by aerobic exposure.

**Conclusions**

The addition of probiotic Probiotic starter with heriyaki powder to silage is known to maintain a low pH value, thereby reducing the decline in silage quality when exposed to aerobic exposure. Probiotic starter with heriyaki powder is more effective at maintaining low pH values. Bacteria with characteristics resembling *Lactobacillus* and *Lactococcus* can be identified. In addition, processing silage in pellet form can be an alternative to preserving ramie silage-based feed which is practical and has a longer shelf life. Further studies are needed to determine the role of microorganisms in the silage fermentation process in order to obtain the best ramie leaf silage formula, and produce functional feed products with high economic value.

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**Author Contributions**

APW designed the study, supervision, interpreted the data, and writing-review & editing. FAR arranged the main manuscript. FAR performed the data collection and analyzed the data. All authors approved the final manuscript.

**Conflict of Interest**

All authors declare no conflict of interest

**Data Availability**

All data generated or analysed during this study are included in this published article.

**Ethics Approval**

Not applicable to this paper

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|  |  |
| --- | --- |
| **A** | **B** |
| **C** |

**Fig 1. (A)** Probiotic starter with heriyaki powder silage pellets; **(B)** Pellet height; **(C)** Pellet diameter

**Table 1.** Silage Quality Categories Based on pH Value.

|  |  |
| --- | --- |
| **Category** | **pH value** |
| Very good | pH 3.2-4.2 |
| Good | pH 4.2-4.5 |
| Average | pH 4.5-4.8 |
| Bad | pH>4.8 |

(Rusdi *et al*. 2021)

**Table 2.** Scoring for Determining the Physical Quality of Silage

|  |  |
| --- | --- |
| Physical Quality | Score |
| Color | 1. No green color, brown to blackKuning kecoklatan 2. Dark green, yellowish green 3. Hijau alami, atau hijau seperti daun direbus |
| Aroma | 1. Natural green, or green like boiled leaves 2. Stimulating odor (ammonia or butyric acid) 3. Medium, sweet, slightly sour smell 4. Fragrant smell of acidity |
| Texture | 1. Soft, peeling, slimy 2. A bit soft, a bit slimy 3. Slightly hard, not slimy 4. Like fresh forage, hard/not soft, not slimy |
| Fungi Existence | 1. Many (> 60%)   1. Medium (30 – 60%) 2. Little (10 – 30%) 3. No mold or free from mold |

**Table 3.** Average pH Value

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment | Average Value | | |
| Control | Probiotic starter with rice bran | Probiotic starter with heriyaki powder |
| 14 Days Fermentation | 4.84 ± 0.020a | 4.64 ± 0.012b | 4.54 ± 0.013c |
| Aerobic exposure | 7.10 ± 0.015d | 6.79 ± 0.013e | 6.59 ± 0.007f |
| Re-ensiling | 6.39 ± 0.005g | 5.65 ± 0.013h | 5.21 ± 0.010i |

note:

a,b..i : Similar letter notation means there is no significant difference at the Mann Whitney test level which has a value of 5%

**Table 4.** Average Organoleptic Test Value

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sample | Parameter | Control | Probiotic starter with rice bran | Probiotic starter with heriyaki powder |
| 14 Days Fermentation | Color\* | 3 ± 0.515a | 3 ± 0.515a | 3 ± 0.289b |
|  | Aroma\*\* | 3 ± 0.603a | 4 ± 0.522b | 4 ± 0.452b |
|  | Texture\*\*\* | 3 ± 0.289a | 3 ± 0.389a | 3 ± 0.289a |
| Aerobic Exposure | Color\* | 2 ± 0.522a | 3 ± 0.522b | 3 ± 0.515b |
|  | Aroma\*\* | 2 ± 0.515a | 3 ± 0.577b | 3 ± 0.452b |
|  | Texture\*\*\* | 3 ± 0.389a | 3 ± 0.389a | 3 ± 0.389a |
| Re-ensiling | Color\* | 2 ± 0.492a | 3 ± 0.452a | 3 ± 0.492a |
|  | Aroma\*\* | 3 ± 0.452a | 3 ± 0.452a | 3 ± 0.452a |
|  | Texture\*\*\* | 3 ± 0.515a | 3 ± 0.389a | 3 ± 0.289a |

Note:

\*1: color brown -black, 2: brownish yellow, 3: dark green-yellowish, 4: natural green;

\*\*1: Stimulating rotten odor, 2: Stimulating odor, 3: Sweet-sour odor, 4: Sour sweet odor;

\*\*\*1: soft, slimy, 2: somewhat soft, somewhat slimy, 3: somewhat hard, not slimy, 4: like fresh greens, hard/not soft, not slimy;

a,b : Similar letter notation means there is no significant difference at the Mann Whitney test level which has a value of 5%

**Table 5.** Comparison of Ramie Leaf Surfaces

|  |  |  |  |
| --- | --- | --- | --- |
| Fresh Ramie Leaf | 14 Days Fermentation of Silage | | |
| Control | Probiotic starter with rice bran | Probiotic starter with heriyaki powder |
|  |  |  |  |

**Table 6.** Macroscopic Morphology of Silage Microbes on NA media

|  |  |  |
| --- | --- | --- |
| Sample | NA | |
| Control | Isolate NK1 | Isolate NK2 |
| Probiotic starter with rice bran | Isolate ND1 | Isolate ND2 |
| Probiotic starter with heriyaki powder | Isolate NH1 | Isolate NH2 |

**Table 7. TPC silage fermentation results for 14 days**

|  |  |  |
| --- | --- | --- |
| Sample | NA (106 CFU/mL) | |
| Control | 113 |
| Probiotic starter with rice bran | 145 |
| Probiotic starter with heriyaki powder | 156 |

**Table 8.** Average Feed Consumption

|  |  |  |
| --- | --- | --- |
| Test Animals | Type of Feed | |
| Standard Feed | Probiotic starter with heriyaki powder Silage |
| ------------------gram/day------------------ | |
| 1 | 669.5 | 817.5 |
| 2 | 561 | 707 |
| 3 | 456 | 644.5 |
| 4 | 608.5 | 715 |
| 5 | 442 | 621.5 |
| Average | 547.4 ± 97.8 | 701.1 ± 76.3 |