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Utilization Of Liquid Winprob Fermented Corn Ash With Various Time Durations For In Vitro Analysis Digestibility

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Abstract. *The purpose of this study is to determine the efficiency of corn ash fermented with Winprob for various durations on dry matter digestibility, organic matter digestibility, and crude fiber digestibility in vitro. The hypothesis proposed is that the addition of Winprob probiotics in corn ash fermentation at different times can improve the digestibility of dry matter, digestibility of organic matter, and digestibility of crude fiber. The research design used was a non-factorial completely randomized design (RAL) with four treatments and five replications. The treatments were studied as follows: P0 (control/corn ash without fermentation); P1 (corn ash fermented with Winprob for seven days); P2 (corn ash fermented with Winprob for 14 days); and P3 (corn ash fermented with Winprob for 21 days). The observed parameters include dry matter digestibility, organic matter digestibility, and crude fiber digestibility in livestock in vitro. The results showed that the treatment had a significant effect on the digestibility parameters of dry matter and the digestibility of coarse fiber and the digestibility of organic matter showed a significant influence (P>0.05).*

Keywords *Liquid Winprob, Fermentation, Corn Ash, In Vitro*

INTRODUCTION

Feed is one of factor main influencing factors success in business farm. Availability quality feed become element crucial in increase productivity livestock, good in aspect growth, reproduction, and results production like meat , milk, or wool. Besides that, feed also has an impact significant in aspects economy business farm Because around 60–80% of the total cost production spent For provision feed (Mulyani et al., 2021). Therefore that, effort management Efficient and innovative feed is essential For support sustainability industry farm.

Utilization waste agriculture, plantations, and agroindustry become one of the effective strategies for fulfil need feed ruminants. Wastes This generally own great potential Because availability abundant and not compete with need man as material food. One of the waste results agriculture that has potential big For utilized is ash corn. corn Alone is plant food products its production Enough high and frequent used as source energy main in material feed livestock. Based on data from the Central Statistics Agency (BPS) of North Sumatra Province in 2022, the area harvest corn in the area the reaching 289, 238 hectares with results production amounting to 1,806,544 tons.

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Corn ash, which is a waste from results harvest plant corn, has content adequate nutrition Good For cattle ruminants. According to research by Sandy et al. (2023), ash corn has great potential For made into feed alternative Because its abundant availability, not compete with need food human beings, and content its nutrition sufficient For fulfil need livestock. However, the quality experience ash corn often not optimal for made into feed main. Therefore that, is needed innovation in processing waste ash corn use increase mark nutrition and digestibility, so that can utilized in a way maximum as feed cattle.

One of methods that can applied for increase quality nutrition ash corn is fermentation. Fermentation is technique processing biological involving activity microorganisms in to describe compound complex become more compounds simple. This process can increase digestibility and value nutrition material the feed that was originally quality low. According to Riswandi et al. (2017), fermentation capable reduce content fiber rough, increase protein content, and make material feed more easy digested by livestock ruminants. In addition that, fermentation can also remove anti- nutritional compounds that often inhibit the digestive process.

Fermentation process need bioactivator for support activity microorganisms optimally. One of the effective bioactivator is Winprob. Winprob contain various type microorganisms, such as Aspergillus niger, Bacillus subtilis, Lactobacillus acidophilus, Rhizopus oligosporus, Saccharomyces cerevisiae, and Trichoderma viride. Microorganisms This play a role in to describe fiber rough, increase availability nutrition, as well as produce enzymes that help the fermentation process (Putri et al., 2020). The use of Winprob as bioactivator expected capable increase quality nutrition ash corn so that can fulfil need feed cattle with more good.

Testing quality material feed results fermentation can done use in vitro methods. In vitro techniques allow researcher for evaluate digestibility a material feed in a way No direct without involving test animals. According to Suningsih et al. (2017), method This use tube a fermenter that mimics condition tool digestion ruminants. In vitro techniques have a number of advantages, such as efficiency time, more cost economical, and convenience implementation. In addition that, method This can provide accurate data related digestibility material dry, material organic, and fiber rough from material tested feed.

Fermentation with use Winprob expected can give significant results in increase digestibility ash corn as feed livestock. Variation duration fermentation be one of factor important things to do investigated, because time fermentation can influence level decomposition compound organic and change quality nutrition material feed. The longer the time fermentation, activity microorganisms can increase until reach optimal conditions, but if too long, can happen decline quality consequence degradation excessive. Therefore that, research about duration optimal fermentation becomes important for determine quality feed best.

With background behind said, research this focus on analysis digestibility cattle sheep in vitro using ash fermented corn with Winprob on duration different times. Research This aiming for identify influence variation time fermentation to digestibility material dry, material organic, and fiber rough ash corn. It is expected that the results study This can give contribution in development technology processing feed based on waste efficient farming, while support sustainability business farm.

Corn ash as waste agriculture which is often not utilized optimally can become solution feed innovative and economical alternative. With increase quality nutrition through the fermentation process, waste This can become source powerful feed use high. This is no only give benefit for breeders, but also helps reduce problem environment consequence waste agriculture. Use bioactivator like Winprob give opportunity big for increase quality results fermentation, so that produce feed with mark more nutrition higher and more digestible good.

Study This expected capable give solution concrete to problem feed cattle ruminants, in particular for breeder sheep. With utilise ash fermented corn, farmer can reduce dependence on materials feed conventional which tends to be expensive and difficult accessed. In addition that, the use of waste agriculture as feed livestock also supports principle economy circular, where waste utilized return for produce mark add. With thus, research this no only relevant from aspect scientific, but also provides impact positive for sustainability livestock and the environment.

From the whole the description above, can concluded that effort improvement quality ash corn as feed ruminants through fermentation is step strategic needs developed. With use bioactivator Winprob and variations time proper fermentation, is expected can produced feed quality capable height increase digestibility material dry, material organic,

and fiber rough on livestock sheep. Research This aiming for give contribution real in development technology feed alternative based source Power local, at the same time support efficiency and productivity in sector farm.

METHODS

Location and Time of Research

Study this implemented in the month August until September at the Panca Budi Development University Laboratory. The testing process digestibility in vitro continued in the Laboratory Animal Husbandry, Faculty Animal Husbandry, Panca Budi Development University.

Material Study

Material main used in study this covering ash corn, bioactivator Winprob, molasses, urea, and sheep rumen fluid. As complement for analysis laboratory, used McDougall fluid with formulation as following:

1. 9.8 grams $NaHCO_3$,
2. 4.62 grams $Na_2HPO_4 \cdot 12H_2O$,
3. 0.57 grams KCl ,
4. 0.12 grams $MgSO_4 \cdot 7H_2O$,
5. 0.47 grams of NaCl, and
6. 0.05 grams $CaCl_2 \cdot 2H_2O$ per liter of solution .

Besides that, other materials are used covers $HgCl_2$, Na_2CO_3 , sheep rumen fluid as much as 200 ml, 0.2% pepsin solution dissolved in 0.1 N HCl, and distilled water.

Research Tools

Study This utilise various equipment for fermentation and analysis laboratory. Tools for fermentation includes plastic drums, buckets, watering cans, scales, shovels and equipment write. For analysis laboratory, used grinder, oven, furnace, scale analytical, centrifuge tube, centrifuge, water bath shaker, thermos, hose, CO_2 gas cylinder, cap ventilated, desiccator, funnel, Whatman paper, pH meter, and other relevant equipment for in vitro analysis.

Design study this use method experimental with approach Design Random Complete (RAL) non- factorial. Research This consists of from four treatment with five repetitions. Tested treatments is as following:

P0: Corn ash without fermentation

P1: Fermented corn ash with Winprob for 7 days

P2: Fermented corn ash with Winprob for 14 days

P3: Fermented corn ash with Winprob for 21 days

Every treatment analyzed for evaluate its influence to digestibility material dry, material organic, and fiber rough in vitro.

Refining Corn Cobs into Corn Ash

The stages of processing corn cobs to produce corn ash are as follows:

1. Corn cobs are first cleaned of dirt or foreign objects attached to them.
2. The corn cobs are then dried in the sun to facilitate the refining process.
3. Dried corn cobs are crushed using a crusher to produce corn ash.
4. The resulting corn ash is dried again to reduce its water content.
5. Corn ash is ready to be used as a basic research material.

Corn Ash Fermentation Process

1. The corn ash fermentation process begins with preparing the ingredients and weighing them according to needs. Corn ash is placed on the cement floor, while probiotics (Winprob) are dissolved in water that has been mixed with molasses. The volume of water used is about 30% of the total ingredients, or to achieve 60% humidity. The molasses and probiotic solutions are then poured evenly over the corn ash. Next, urea is sprinkled over the mixture and stirred using a shovel until homogeneous.
2. After homogenization, corn ash is put into a plastic drum and compacted by stepping on it. The drum is then tightly closed to create anaerobic conditions, and the fermentation process lasts for 7 days (P1), 14 days (P2), and 21 days (P3).

Sampling for Analysis

Samples for chemical analysis of nutrient content were taken randomly from each treatment. Sampling was carried out at:

1. Corn ash without fermentation (P0),
2. Corn ash fermented for 7 days (P1),
3. Corn ash fermented for 14 days (P2), and
4. Corn ash fermented for 21 days (P3).

The samples taken were immediately dried by drying them in the sun or using an oven at a temperature of 60°C. Once dry, the samples were weighed, ground using a blender, and ready to be analyzed in the laboratory.

Rumen Fluid Collection

Sheep rumen fluid was obtained from a slaughterhouse (RPH). Thermoses used to store rumen fluid are plastic, glass, or cork thermoses. The thermos is filled with warm water at a temperature of ±39°C to maintain the internal temperature, then tightly closed. Before use, the warm water in the thermos is discarded. Rumen fluid is obtained by squeezing the contents of the rumen using gauze or a nylon filter (40 microns), then put into a thermos that has been heated beforehand.

In Vitro Digestibility Test

In vitro testing consists of two stages, namely:

First Stage: Simulation of Fermentative Digestion in the Rumen

1. A 50 mL polypropylene tube was used as a fermenter. Each tube was filled with 2 grams of ground corn ash sample and sieved using a 1 mm sieve.
2. Into each tube, 30 mL of McDougall's mixed solution and rumen fluid were added in a ratio of 4:1.
3. Empty tubes without samples were used as controls (blanks). The residue from the blanks was used to correct the digestibility of fermented corn ash.
4. The mixture in the tube was flowed with CO_2 gas for 30 minutes at 39°C in a water bath to create anaerobic conditions until the pH reached 6.9.
5. After that, the mixture is put into a fermenter tube and closed with a rubber stopper with a valve (to release the fermentation gas).
6. The tubes are incubated in a shaker bath or incubator at 39°C for 48 hours.

This stage represents a simulation of fermentative digestion in the rumen. After 48 hours of fermentation, the tube cap is opened and proceed to the second stage.

Second Stage: Post Rumen Enzymatic Hydrolysis Simulation

1. After the first stage of fermentation is complete, microbial activity is stopped by placing the fermenter tube in cold water or ice.
2. The resulting substrate was added with pepsin-hydrochloric acid (HCl) solution to continue the simulation. In each tube, 2 mL of 4N HCl solution and 0.06 grams of pepsin were added.

3. The tubes were re-incubated at 39°C for 48 hours, this time without the rubber stopper.
4. Once completed, the remaining digestion is filtered using filter paper and the residue is put into a crucible.
5. The residue was dried in an oven at 105°C for 24 hours to calculate the dry matter (DM).

This stage simulates the post-rumen enzymatic hydrolysis process. The resulting residue is further analyzed to assess digestibility parameters, including dry matter, organic matter, and crude fiber.

Analysis of SA Data

Result data study analyzed with fingerprint ANOVA variety and if there is the real difference will to be continued with the DUNCAN further test.

Parameters Which are Observed

Coefficient digest Dry Ingredients

The coefficient of dry matter is one of the indicators for determining the quality. The higher the dry matter digested, the higher the opportunity for nutrients that can be utilized by livestock. Digestibility in vitro of dry material is calculated using formula as following (Tilley and Terry, 1963):

$$\%\text{KcBK} = \frac{Berat\ BK\ sampel\ (g) - Berat\ BK\ residu(g) - Berat\ blanko(g)}{BK\ sampel(g)} x100\%$$

Digestibility Coefficient of Organic Matter

The digestibility coefficient of organic matter is the percentage of protein, fat, vitamin and carbohydrate that digest duringiprocess. The high low KCBO feed can describe the availability of energy which can utilize for livestock in digestibility of material is calculated ii using i formula i as :

$$\%\text{KcBO} = \frac{Berat\ BO\ sampel\ (g) - Berat\ BO\ residu(g) - Berat\ blanko(g)}{BO\ sampel(g)} x100\%$$

Coefficient digest Fiber Rough

As many as 2 grams sample entered into the cup porcelain, then oven at 105º C for 12 hour, and cooled down in desiccator ±1 hour. After cold do weighing furthermore glow into the furnace 600ºC for 8 hours until become ash , then entered to desiccator for 1 hour, then weigh and do calculation with formula as following :

$$\%\text{KcSK} = \frac{Berat\ SK\ sampel\ (g) - Berat\ SK\ residu(g) - Berat\ blanko(g)}{SK\ sampel(g)} x100\%$$

RESULTS

The overall research results covering the in vitro KcBK, KcBO and KcSK values are presented in Table 1.

Table 1. Recapitulation of The Average Results of The KcBK, KcBO, KcSK Research in Vitro on Corn Ash Fermented with Winprob at Different Times

Treatment	Observation Parameters		
	KcBK	KcBO	KcSK
P0	33.29 [a]	48.13 [a]	27.22 [a]
P1	38.76 [b]	53.07 [b]	29.18 [b]
P2	40 .34 [c]	58.27 [c]	30.67 [c]
P3	42.59 [d]	64.33 [d]	31.39 [d]

Note: Different superscripts on the same row indicate significantly different (P<0.0 5).

DISCUSSION

Dry Matter Digestibility Coefficient (DMC)

Dry matter digestibility coefficient (DMC) is an indicator used to measure the ability of feed ingredients to digest in the digestive system of livestock. This measurement is important because it provides an overview of how efficiently livestock can utilize the feed ingredients provided. Based on the results of the study, corn ash fermentation using the Winprob bioactivator has been shown to have a significant effect on increasing dry matter digestibility (DMC). This study also shows that the duration of fermentation has a different impact on the level of dry matter digestibility produced.

In the P3 treatment, which involved corn ash fermentation for 21 days, the highest KcBK value was obtained at 42.59%. This shows that fermentation for a longer duration provides the best effect on dry matter digestibility. In contrast, the control treatment (P0) which used corn ash without fermentation only produced a KcBK value of 33.29%. This difference is very significant, indicating that fermentation makes a major contribution to increasing the digestibility of the feed ingredients used.

In other treatments, namely P2 (fermentation for 14 days) and P1 (fermentation for 7 days), each produced KcBK values of 40.34% and 38.76%. Although these values were lower compared to treatment P3, both were still higher than the control treatment that did not use fermentation. This illustrates that even though the fermentation duration was shorter, the fermentation process still provided a significant increase in dry matter digestibility compared to unfermented material.

This phenomenon can be explained by the basic principle that the longer the fermentation time, the more microbes grow during the process. These microbes are very important in degrading harder and more difficult-to-digest feed components, such as cellulose and hemicellulose, contained in corn ash. This fermentation process can improve the ability of livestock to utilize feed ingredients, which in turn can increase the efficiency of feed used by the livestock. Therefore, increasing the fermentation duration has a positive impact on feed quality, which is reflected in the increase in the KcBK value.

According to Nasih et al. (2014), the increase in digestibility of fermented feed materials is caused by an increase in the number of microbes in the rumen of livestock. These microbes work synergistically in degrading fiber and other components that are difficult to decompose naturally. In this study, the administration of Winprob as a bioactivator in the fermentation process helped increase the number of microbes involved in the digestion process. This has a direct impact on increasing the digestibility of the feed materials used.

The fermentation process of corn ash with Winprob not only increases the number of microbes, but also activates the activity of these microbes in breaking down components of feed ingredients that are difficult to digest. One of the main microbes involved is Aspergillus niger, known as cellulolytic bacteria. These bacteria produce cellulase enzymes that play an important role in degrading cellulose found in feed ingredients such as corn ash. With the increased activity of these enzymes, the feed given becomes easier for livestock to digest, which ultimately increases the efficiency of feed use by livestock.

The increase in the microbial population in the rumen that occurs due to the fermentation process also contributes to improving feed quality. These microbes not only help degrade cellulose, but also break down hemicellulose and other components found

in the feed. This makes the nutrients in the feed more accessible and digestible to livestock, thereby improving the overall quality of the feed.

In addition, according to Bata (2008), the increase in digestibility of fermented feed materials can be seen from the success of microbes in degrading various feed nutrients, be it cellulose, hemicellulose, or other dissolved materials. With the increasing population of microbes in the rumen, the fermentation process becomes more efficient in degrading feed components that are difficult to decompose. Therefore, this increased digestibility of dry matter can be used as an indicator of the success of fermentation in improving feed quality.

The results of the analysis of variance conducted in this study also support these findings. The administration of Winprob in the corn ash fermentation process has a very significant effect on dry matter digestibility ($P < 0.01$). This shows that the use of Winprob as a bioactivator in the fermentation process significantly increases the digestibility of feed ingredients in each treatment carried out. The positive effects of using Winprob can be felt in each treatment, both those using fermentation for 7 days, 14 days, and 21 days.

The results of this study indicate that the duration of fermentation has a positive effect on increasing dry matter digestibility. The longer the fermentation time, the more microbes grow and the more enzymes are produced, which contributes to increasing the digestibility of feed ingredients. Thus, corn ash fermentation using Winprob for 21 days (P3) gave the best results in terms of dry matter digestibility compared to other treatments.

Overall, this study shows that the fermentation process of corn ash using Winprob provides a significant increase in dry matter digestibility. This shows the importance of the fermentation process in improving feed quality, especially for feed ingredients that have high fiber content such as corn ash. By using bioactivators such as Winprob, the fermentation process can be carried out more efficiently, which in turn can increase the efficiency of feed use by livestock and ultimately increase overall livestock productivity.

Organic Matter Digestibility Coefficient (KcBO)

Table I shows that corn ash fermentation with Winprob has a significant effect on the digestibility of organic matter. The treatment that showed the highest level of organic matter digestibility was the treatment of corn ash fermented with Winprob for 21 days (P3), with a digestibility value of 64.33%. Furthermore, the 14-day fermentation treatment (P2) showed a digestibility of 58.27%, while in the 7-day fermentation

treatment (P1) the digestibility of organic matter was recorded at 53.07%. The control treatment, namely corn ash without fermentation (P0), had the lowest digestibility value, which was 48.13%. From these results, it can be concluded that the corn ash fermentation process with Winprob, especially with a longer fermentation duration, can increase the digestibility of organic matter compared to corn ash without a fermentation process.

The results of a more in-depth analysis of the existing data also showed that the addition of Winprob to each treatment did not have a significant effect (P> 0.05) on the digestibility of organic matter. However, the increase in digestibility in the P3 treatment (fermented corn ash for 21 days with Winprob) can be explained by the increase in the bacterial population in the rumen. The increase in the number of bacteria in the rumen plays a role in the fermentation process and more efficient fiber breakdown. In the P3 treatment, the bacterial population is thought to obtain sufficient energy sources during the fermentation process, which allows them to work optimally in degrading fiber and rumen microbes. Wallace and Newbold (1992) explained that the administration of probiotics, such as Winprob, can increase the bacterial population in the rumen, so that the digestibility of organic matter becomes better.

In addition, the increase in organic matter digestibility is also caused by the increase in dry matter digestibility. The fermentation process can improve feed quality by accelerating the dry matter degradation process. The ash content in feed tends to slow down or inhibit the dry matter digestibility process. However, with the fermentation process, dry matter digestibility also increases, which in turn increases the overall organic matter digestibility.

The increase in crude protein content in feed also contributes to the increase in organic matter digestibility. Crude protein is one of the important components in feed that greatly affects rumen microbial activity. More active rumen microbes will be more efficient in digesting organic matter, including fiber and other nutrients. This increase in crude protein content can be caused by the fermentation process which improves feed quality. This is in accordance with the opinion of Tillman et al. (1998) who stated that organic matter digestibility reflects how much substance can be digested, especially compounds containing nitrogen, carbohydrates, fats, and vitamins.

In order to improve the effectiveness of animal feed, it is very important to understand the relationship between the fermentation process and feed ingredient content.

The addition of Winprob to corn ash fermentation has been shown to have a positive impact on organic matter digestibility. However, although there was a significant increase in the P3 treatment, it should be noted that not all treatments showed significant changes in organic matter digestibility ($P > 0.05$). This suggests that there is variability in the effect of probiotics on digestibility, which may be influenced by various factors such as feed composition, the type of microbes involved, and the fermentation conditions applied.

Increasing the digestibility of organic matter can lead to increased feed efficiency, meaning that livestock can absorb more nutrients from the feed provided. This has the potential to reduce feed costs in livestock farming, while increasing livestock productivity. Therefore, further research on optimizing the fermentation duration and concentration of Winprob in feed is essential to achieve maximum results in increasing the digestibility of organic matter in livestock feed.

Overall, it can be concluded that the treatment of corn ash fermentation with Winprob for 21 days gave the best results in increasing the digestibility of organic matter, although the effect of Winprob addition on the digestibility of organic matter in each treatment was not significant. Factors such as rumen bacterial population, crude protein content, and dry matter quality play an important role in the results obtained. Thus, corn ash fermentation with probiotics such as Winprob can be a good alternative in improving the quality of animal feed and digestion efficiency.

Digestion Coefficient Crude (KcSK)

Table I shows that the treatment of corn ash fermentation with Winprob has a significant effect on the digestibility of crude fiber. In the treatment of corn ash fermentation for 14 days with Winprob (P2), the highest crude fiber digestibility value was recorded, which was 30.67%. The treatment with fermentation for 21 days (P3) showed a slight increase with a digestibility value of 31.39%, while in the treatment of fermentation for 7 days (P1), the crude fiber digestibility value recorded was 29.18%. The control treatment, namely corn ash without fermentation (P0), had the lowest crude fiber digestibility, which was 27.22%. These results indicate that corn ash fermentation with Winprob, especially at longer fermentation durations, can increase crude fiber digestibility much higher than unfermented corn ash.

Based on the research results, it can be concluded that fermentation of corn ash with Winprob for various durations has a significant effect on the digestibility of crude fiber.

This effect is increasingly evident in the treatment using Winprob, with a much higher digestibility of crude fiber compared to corn ash without fermentation. De Carvalho et al. (2010) in their research stated that the crude fiber content in feed greatly affects the consumption of crude fiber by livestock. Too much crude fiber in feed can reduce the level of livestock consumption, while too little crude fiber can have a negative impact on fermentation activity in the rumen. Therefore, the balance of crude fiber content in feed is very important to support optimal digestibility.

In Table I, it can also be seen that there was an increase in the digestibility value of crude fiber in treatments P0, P1, and P2, but there was a decrease in treatment P3. The highest digestibility value was found in treatment P2, namely corn ash fermentation with Winprob for 14 days, which reached 33.88%. This shows that fermentation with Winprob gave the best results in this treatment. The results of Duncan's further test showed that the difference in digestibility of crude fiber between treatments P2 and P3 was very significant. In other words, although the fermentation duration in treatment P3 was longer, it turned out that treatment P2 gave better results in increasing digestibility of crude fiber.

Rumen fluid contains various microbes that produce enzymes such as amylase, protease, and cellulase. These enzymes function to degrade nutrients in feed into simpler forms, allowing bacteria in the rumen to digest feed more efficiently. This process ultimately increases overall feed digestibility. According to Jhonson (1996), enzymes produced by rumen microbes play an important role in increasing feed digestibility, by accelerating the digestion process of nutrients in feed, especially crude fiber.

However, although fermentation with Winprob can increase the digestibility of crude fiber, corn ash itself is classified as a feed with low-quality fiber. According to Chen et al. (2004), corn ash has low digestibility and palatability, which is caused by its high lignin content. High lignin in corn ash forms a complex with cellulose and hemicellulose, which makes fiber digestion more difficult. Therefore, although fermentation can increase the digestibility of corn ash, lignin content remains a major challenge that needs to be overcome so that feed quality can be further improved.

Fermentation as a feed processing technique is one way to improve the quality of feed ingredients, including the digestibility of crude fiber. The fermentation process can break down components that are difficult to digest in crude fiber and increase the

availability of nutrients for livestock. In addition, microorganisms involved in the fermentation process can produce enzymes that are more effective in digesting crude fiber, thereby increasing digestibility. Therefore, fermentation techniques using agents such as Winprob can be a good solution to overcome digestibility problems in corn ash-based feed.

However, although fermentation techniques can increase the digestibility of crude fiber, there are several factors that need to be considered in the implementation of fermentation. The duration of fermentation, the type of microorganisms used, and environmental conditions during fermentation are some of the factors that affect the final results of the fermentation. In this study, it was seen that fermentation with Winprob for 14 days (P2) gave the best results in increasing the digestibility of crude fiber. Longer fermentation durations (such as in the P3 treatment) did not always give better results, indicating that optimal fermentation time is very important to achieve maximum digestibility.

Overall, it can be concluded that corn ash fermentation treatment with Winprob can increase crude fiber digestibility, with the best results found in the treatment using fermentation for 14 days (P2). The administration of Winprob in the fermentation process showed a significant increase in crude fiber digestibility, although corn ash itself has a high lignin content, which can inhibit digestibility. Fermentation techniques can improve feed quality, but factors such as fermentation duration and the type of microbes used must be carefully considered to achieve optimal results.

CONCLUSION

The conclusion of this study is that corn ash fermentation using Winprob as a bioactivator significantly increases the digestibility of livestock feed ingredients. The longer the fermentation duration, the higher the digestibility obtained, with a fermentation treatment of 21 days (P3) providing the best results for dry matter digestibility (KcBK) and organic matter (KcBO). The fermentation process increases the number of microbes in the rumen of livestock, which helps degrade difficult-to-digest components in corn ash such as cellulose and hemicellulose, increasing feed efficiency. In crude fiber digestibility (KcSK), a fermentation treatment of 14 days (P2) showed the best increase, although longer fermentation did not always produce better results. Factors such as fermentation

duration, type of microorganisms, and fermentation conditions greatly affect the results. Overall, corn ash fermentation with Winprob improves feed quality and livestock digestion efficiency, which has the potential to reduce feed costs and increase livestock productivity. Further research is needed to optimize the fermentation duration and Winprob concentration for maximum results.

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