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Effect of the Administration of Fermented Herbal Ingredients with Local Bio activators on the Consumption, Digestibility of Crude Fiber and Crude Fat in Pig Cattle in the Grower Phase Pigs

Apolinaris Nadi Fouk[1], Sabarta Sembiring[2], Ni NengahSuryani[3], David A. Nguru[4]

[1,2,3,4]Department of Animal Science, Faculty of Animal Husbandry, Marine Affairs and Fisheries, Nusa Cendana University

ABSTRACT: The purpose of this study is to determine the effect of the use of fermented herbal ingredients with local bioactivators on the consumption and digestibility of crude fiber and crude fat of landrace peranakan pigs and also to find out the best level of fermented herbal ingredients. The livestock used were 12 landrace landrace grower phase pigs aged 3-4 months with an initial body weight ranging from 34-43 kg with an average weight of 37 kg (KV= 14.12%). This study used a Complete Random Design (RAL) consisting of 4 treatments and 3 replicas so that there were 12 experimental units. The treatment given was H0: liquid feed without herbs, H1: liquid feed + 10% fermented herbs, H2: liquid feed + 15% fermented herbs and H3: liquid feed + 20% fermented herbs. The variables studied were consumption and digestibility of crude fiber and crude fat. The results showed that the treatment had a very pronounced effect ($P<0.01$) on crude fiber consumption, crude fat and crude fiber and crude fat digestibility. It was concluded that the use of fermented herbal ingredients in rations at the levels of 10%, 15% and 20% had a very pronounced effect on crude fiber consumption, crude fat consumption, crude fiber digestibility and crude fat digestibility of landrace landrace pig farms in the grower phase.

KEYWORDS: Babi grower, bahan herbal fermentasi, lemak kasar, serat kasar.

INTRODUCTION

Good livestock health management can optimize livestock productivity to the maximum. Digestive tract health is an important aspect in supporting the health of pigs. A healthy digestive tract can improve feed digestibility and optimal nutrient absorption. The disease court management pattern needs to be considered in order to get optimal production, especially in the digestive tract of livestock. The process of digesting food in the digestive tract is influenced by the health of the digestive tract in working to overhaul food substances and absorb them (Liao & Nyachoti, 2017). In supporting the health of the digestive tract, there needs to be a solution in maintaining and improving the health of livestock.

Herbal plants are the best alternative as natural probiotics that are effective and safe in improving the health of the digestive tract naturally. Natural probiotics from herbal plants can improve the microbial balance in the digestive tract, improve the digestibility of feed and reduce the risk of indigestion. Herbal plants contain compounds that are efficacious as antibacterial. (Mindung et al., 2025). The use of herbal ingredients has been piloted by (Suryani & Aryanta, 2020). Giving herbal ingredients such as curcuma can increase immunity and improve the performance of the digestive tract. Temulawak can be used as a feed supplement to increase palatability and feed consumption, as well as reduce parasitic infections in pigs (Listyowati et al., 2022). Temulawak can improve nutrient digestion (Wudy, et al. 2018); the combination of garlic and ginger 0.02% can improve protein and fat digestibility (Masneno, et al. 2018); increase body weight gain in Aryanta pigs, (2019). The use of herbal plants is also able to improve feed efficiency and livestock health (Zainuddin, 2018), spurring pig growth (Sinaga, et al. 2011). A mixture of turmeric, ginger and betel leaves can increase livestock productivity (Luji., et al. 2016). Garlic contains anti-microbial compounds that can help reduce the growth of pathogenic bacteria in the digestive tract, which can interfere with the digestive process and nutrient absorption (Moulia, 2018). The andrografollide content in sambiloto can help increase immune function, which is very important for maintaining the health of pigs. The application of herbal plants can also be used as an alternative sulfa to overcome diseases caused by bacteria (coccidiosis) (Wiedosari, et al. 2014).

The phytochemical content in each of these herbal ingredients has a very good impact on livestock, especially on the digestive tract. A healthy digestive tract can increase the consumption and digestibility of nutrients, antibacterial substances and can suppress pathogenic bacteria so that nutrients can be digested and absorbed more efficiently. The efficiency of digestion, absorption of crude fiber and crude fat can be known from the amount of crude fiber and crude fat absorbed. Based on the above background, a study has been conducted with the title: Effect of the application of fermented herbal ingredients with local bioactivators on consumption,

digestibility of crude fiber and crude fat in pigs in the grower phase.

MATER AND RESEARCH METHODS

Place and Time of Research

This research was carried out in Hamlet II, East Baumata Village, Taebenu District, Kupang Regency, East Nusa Tenggara Province, using a pig farm owned by Mr. Ir. I Made S. Aryanta, MP. The time of this study lasted for 8 weeks and was divided into 2 stages, namely an adjustment period of 2 weeks and data collection of 6 weeks.

RESEARCH MATERIALS

Livestock and Research Cages

The study used 12 experimental pigs in the Landrace grower phase. Body weight ranges from 34-43 Kg with an average of 37 Kg (KV=4.12%). The cages used are individual cages of 12 plots with a size of 2 x 1.8 m each plot with a floor slope of 2°, equipped with a feed and drinking water place.

Research Equipment

The equipment used in this study is: hanging timber with a capacity of 110 Kg to weigh the weight of pigs and feed materials, a scale with a capacity of 5 Kg to weigh rations, stationery and cage cleaning equipment.

Research Basal Ration

The preparation of the basalt ration is based on the nutritional requirements of pig farmers in the grower phase, namely 18- 24% protein and metabolic energy of 3100-3200 kcal/kg (NRC, 1998).

The feed ingredients used in this study are corn flour, rice bran, KPG 709 concentrate and Mineral-Mix. The composition and nutritional content of the ingredients that make up the research ration can be seen in Table 1 and Table 2.

Feed Ingredients	Nutritional Content						
	BK (%)	EM (Kkal/Kg)	PK (%)	SK (%)	LK (%)	Ca (%)	P (%)
Corn Flour[1]	89	3420	8,3	8	3,92	0,03	0,28
Rice bran [1]	91	2850	13,3	13,9	13	0,07	1,61
KPG709 Concentrate[2]	90	3412	38	2,96	7	4	1,6
Mineral-Mix[3]	1	0	0	0	0	43	10

Source: 1 NRC (1998), 2 Labels on KGP-709 concentrate feed sacks, 3 Nugroho (2014).

Feed Ingredients	Composition%	BK (%)	EM Kkal/Kg	PK (%)	SK (%)	LK (%)	Ca (%)	P (%)
Corn Flour	40	35,6	1368	3,32	3,2	1,568	0,02	0,112
Rice bran	31	28,21	883,5	4,123	4,309	4,03	0,07	0,491
KPG709 Concentrate	28	25,2	955,36	10,64	1,96	0,828	1,12	0,448
Mineral-Mix	1	1	0	0	0	0	0,43	0,1
Total	100	89,01	3206,86	18,08	6,468	9,466	1,587	1,159

Description: Calculated based on Table 1.

RESEARCH METHODS

This study used a complete random design (RAL) with 4 treatments and 3 replicates, so there were 12 experimental units.

The treatments tried in this study are as follows: H0: *liquid feed*

H1: *Liquid Feed* + Fermented Herbs 10% (100ml/ liter of water) H2: *Liquid feed* + fermented herbs 15% (150ml/liter of water) H3: *Liquid feed* + fermented herbs 20% (200ml/ liter of water) Description: *liquid feed* (basalt ration + water 1:2)

Research Procedure

The research began with the manufacture of local microorganisms (MOL) which were then used as bioactivators in the fermentation of herbal ingredients.

MOL Manufacturing Procedure

The procedure for making MOL is based on the recommendations of Khasanah et al. (2019).

1. Taking the contents of the rumen from the RPH (slaughterhouse) and accommodating it using a bucket and filtering it using a

cloth.

2. The banana hump is mashed later, as much as 1 kg is mixed with 500 grams of rumen liquid that has been filtered, 100 ml of sugar water, 1 liter of coconut water and 1 liter of rice washing water.
3. The mixture was cubed for 21 days in a tightly closed container (*anaerobic*).

Fermented Herbal Manufacturing Procedure

Procedure for making liquid feed ingredients (Khasanah et al. 2019):

1. Herbal ingredients are in the form of 150gr curbubul, 100gr sambiloto leaves, 100gr betel leaves, 100gr garlic, 100gr papaya leaves, 100gr ginger and 100gr moringa leaves.
2. All ingredients are mashed using a blender then squeezed and extracted and then diluted in 2 liters of water.
3. The diluted herbal ingredients are then fermented using the finished MOL.
4. Fermentation of herbal ingredients using MOL lasts for 6 days in *an anaerobic state.*
5. After 6 days of fermentation, it is called liquid feed, which is used as a research material.

Rout Mixing Procedure

The feed material provided is a basalt ration in the form of flour mixed homogeneously according to the composition listed in Table 3. Then fermented herbal ingredients are added according to the treatment level of 10%, 15%, 20% by *liquid feed* or 100mL of herbal ingredients/liter of water, 150mL of herbal ingredients/liter of water and 200mL of herbal ingredients/liter of water.

Procedure for Randomizing Livestock to Research Rations

Before starting the randomization, the research cattle were weighed so that the initial weight variation was known, then given the cage number from 1 to 12. Furthermore, the livestock were sorted according to weight, each group consisted of 3 pigs.

Table 3. Average body weight of randomized pigs (kg)

	Treatment/ No. Enclosure			
Group	H0	H1	H2	H3
I	35/7	37/12	37/8	43/2
II	38/1	34/4	35/3	39/9
III	34/5	35/10	38/6	36/11
Total	107	106	110	116
Average	35,67	35,33	36,66	38,67

Description: Weighing the first week of data collection of research livestock

Procedure for Giving Rations and Drinking Water

The ration is weighed first based on the daily requirement of 3% of body weight (NRC, 1998) then fermented herbs are added according to the level of treatment by *liquid feed* and the ration is given in a day, namely in the morning and evening. Drinking water is given *adlibitum* and is always replaced or added with new water when it runs out or is dirty.

Procedure for Sampling of Rations and Feces for Analysis

The analyzed ration sample was taken as much as 100 grams from each mixture and then taken to the laboratory for analysis. Furthermore, fecal sampling from each treatment is in the last 2 weeks every day for 24 hours. Then each fresh feces taken from 12 research pigs were weighed and recorded for fresh weight, then the feces were dried in the sun until dry. The feces that have been dried in the sun until dry are weighed to determine their dry weight, then 200 grams of each treatment are taken to be taken to the laboratory for laboratory analysis.

RESEARCH PARAMETERS

Consumption of Coarse Fiber

The formula for calculating Crude Fiber Consumption is calculated according to the instructions of Tillman and Reksohadiprodjo, (2005): SK Consumption = Ration Consumption(gr) x BK Ration(%) x SK Ration(%)

Crude Fat Consumption

The formula for calculating Crude Fat Consumption is calculated according to the instructions (Tillman & Reksohadiprodjo, 2005): LK Consumption = Ration Consumption (gr) x BK Ration(%) x LK Ration (%)

Digestibility of Coarse Fiber

The formula for calculating Crude Fiber Digestibility is calculated according to the instructions (Tillman & Reksohadiprodjo, 2005):

$$\text{Digestibility SK (\%)} = \frac{\text{SK consumption (gr)} - \text{Coarse fiber in feces (gr)}}{\text{SK consumption (gr)}} \text{ x } 100\%$$

Digestibility of Crude Fats

Formula for calculating the digestibility of crude fat calculated according to (Tillman & Reksohadiprodjo, 2005):

$$\text{Digestibility LK(\%)} = \frac{\text{LK consumption (gr)} - \text{Crude fat in feces (gr)}}{\text{LK consumption (gr)}} \text{x } 100\%$$

DATA ANALYSIS

The data collected was analyzed using *Analysis of Variance* (Anova) to test the difference between treatments used by the Duncan multiple distance test according to the instructions of Setiawan, (2019).

$Yij = \mu + \beta j + \sum ij$

Description :

Yij	=	The observation value of the jth group that gets Treatment of N Ke-I
M	=	Actual average value or general middle value
Bj	=	Influence of the j-group
Ti	=	Effects of the i-treatment
∑ij	=	Random effect on the jth map of the i-treatment or the experimental error on the i-treatment of the j-group

RESULTS AND DISCUSSION

General Characteristics of Research Livestock

This study observed the adaptation of pigs to the treatment feed for eight weeks. During the adjustment period that lasted for the first two weeks, all pigs were fed treatment to familiarize them with the type of feed to be used during the study. During this period, all cattle show good health conditions, characterized by agile, vigorous behavior and high appetite, which indicates that the feeding of the treatment does not cause health problems or adaptation barriers. Entering the third to eighth week, the cattle continue to show a positive response to the treatment feed. Overall, they consume feed normally, which indicates that the livestock has managed to adapt well to the type of feed given. During the study, all cattle remained in clinically healthy physical condition, without showing symptoms of disease or other health disorders. Thus, this study concludes that all pig farms are able to adapt well to the treatment feed, which is indicated by optimal health conditions, normal feed consumption patterns, and the absence of negative effects during the study period.

Composition and Nutritional Content of Research Rations

The composition of the rations used in this study was 40% corn flour, 31% rice bran, 28% KGP-709 concentrate, 1% mineral-mix and fermented herbal additives according to treatment. The results of the ration analysis were obtained from the results of proximate analysis of the rations mixed homogeneously and then 200 grams were taken for analysis.

The composition of nutrient substances from the study treatment ration based on the results of proximate analysis can be seen in

Table 4. Nutritional content of treatment rations as a result of laboratory analysis

Nutrients	Composition
Dry Ingredients (%)[a]	92,981
Organic Matter (%)[a]	82,316
PK (%)[a]	17,510
LK (%)[a]	6,269
SK (%)[a]	10,478
CHO (%)[a]	58,537
BETN (%)[a]	48,059
GE (MJ/Kg)[b]	16,510
GE (Kkal/Kg)[b]	3.930,88

Description: a Results of Proxy Analysis of the Animal Feed Chemistry Laboratory, Nusa Cendana University. b. Conversion Results of the Animal Feed Chemistry Laboratory, Nusa Cendana University.

The Effect of Treatment on Ration Consumption

The highest average ration consumption was observed in cattle that received H3 treatment, which was 2,495 grams/head/day, then

successively followed by cattle that received H2 treatment of 2,360 grams/head/day, H1 of 2,235 grams/head/day and the lowest average ration consumption was obtained by cattle that received H0 treatment, which was 2,040 grams/head/day. The average treatment of ration consumption is presented in Table 5.

Table 5. Average consumption of research livestock rations (grams/heads/day)

Group	Treatment				Total	Average
	H0	H1	H2	H3		
I	1.860	2.265	2.310	2.535	8.970	2.242
II	2.115	2.160	2.310	2.535	9.120	2.280
III	2.146	2.280	2.460	2.415	9.301	2.325
Total	6.121	6.705	7.080	7.485		
Average	2.040[a]	2.235[ab]	2.360[ac]	2.495[c]		2.282

Description: Mean values with different superscripts on the same row indicate significant differences (P<0.01).

The results of the variance analysis (Anova) showed that the treatment had a very significant effect (P<0.01) on ration consumption. Further analysis with the Duncan test showed that between the H1:H0, H2:H1, H3:H2 treatments, the differences were not noticeable (P>0.05), H3:H1 showed a noticeable difference (P<0.05) while the H3:H0 treatment differed significantly (P<0.01). The more fermented herbs are given increases the consumption of rations because the administration of herbal ingredients can improve the performance of the digestive tract from the phytochemical content it has such as curcumin in curcumin, turmeric which can improve digestion so that the digestibility of nutrients runs smoothly (Suryani and Aryanta, 2020). Temulawak can also stimulate the pancreas for enzyme secretion, so that the digestion of food substances becomes better and smoother and accelerates gastric emptying thereby increasing appetite and consumption of livestock rations. Ginger extract can help stimulate the appetite of cattle and can increase the production of digestive enzymes so that livestock can consume more Alawiyah feed, (2022). Garlic extract is known to contain an active compound called allicin, which has antibacterial and antioxidant properties that are very beneficial for livestock health. The antibacterial properties of allicin can help protect livestock from various diseases caused by pathogenic microorganisms, while its antioxidant properties are able to fight free radicals, thereby increasing the immunity of livestock to various health problems. In addition, garlic has a distinctive aroma, which is not only its unique characteristic but also serves to increase the palatability or attractiveness of feed for livestock, so that livestock become more enthusiastic in consuming the feed provided (Hasnah, 2010).

The use of moringa leaves as an additive in animal feed also has a positive impact on the level of ration consumption given. This happens because the nutritional content in moringa leaves can increase the ability of the livestock body to digest and absorb nutrients more efficiently, thus providing great benefits for the growth and development of livestock. The addition of fresh moringa leaf solution as a supplement mixed into pig feed through *the liquid feeding method* has been proven to be able to enrich the nutritional content of feed. This not only improves the digestion of amino acids that are essential for growth, but also improves the digestion of various other nutrients necessary for the body's metabolism. Increasing the body's ability to digest and utilize these nutrients will encourage a more optimal metabolism, which ultimately supports a significant increase in livestock growth (Suryani et al., 2017).

Effect of Treatment on Crude Fiber Consumption

The highest average crude fiber consumption was observed in cattle that received H3 treatment, which was 243.08 grams/head/day, followed consecutively by cattle that received H2 treatment of 229.92 grams/head/day, H1 of 217.75 grams/head/day and the lowest average ration consumption was obtained by cattle that received H0 treatment, which was 198.78 grams/head/day. The average treatment of crude fiber consumption is presented in Table 6.

Table 6. Average crude fiber consumption of research livestock (grams/head/day)

Group	Treatment				Total	Average
	H0	H1	H2	H3		
I	181,21	220,66	225,05	246,97	873,90	218,48
II	206,05	210,43	225,05	246,97	888,52	222,13
III	209,07	222,13	239,66	235,28	906,15	226,54
Total	596,34	653,24	689,77	729,23		
Average	198,78[a]	217,75[ab]	229,92[ac]	243,08[c]		222,38

Description: Mean values with different superscripts on the same row indicate significant differences (P<0.01).

The results of the variance analysis (Anova) showed that the treatment had a very significant effect (P<0.01) on crude fiber consumption. Further analysis with the Duncan test showed that between the H3:H2, H2:H0, H2:H1 and H1:H0 treatments there were insignificant differences (P<0.05), H3:H1 showed a noticeable difference (P<0.05) while the H3:H0 treatment differed significantly (P<0.01). The use of 15 and 20% fermented herbal ingredients in different rations was very pronounced compared to no fermented herbs H0 against the consumption of crude fiber in experimental pigs.

Pigs that get herbs consume more feed than those that do not consume herbs. The more herbs increase consumption, so more and more crude fiber is consumed. The amount of crude fiber consumed is influenced by the amount of consumption and crude fiber in the ration and in the dry material of the ration (Amheka et al., 2024). The average crude fiber consumption in this study was 222.38 grams/head/day. This average increase shows an increase in crude fiber consumption due to food ingredients or rations in the compatibility of food substances contained in feed ingredients (Uta, et al. 2017). The factors that affect the ration are the level of preference, the composition of the nutrient ration and the level of the protein ration, age, nation and livestock reproduction so that the consumption of crude fiber from each treatment increases. The content of fermented herbal ingredients such as the papain enzyme in papaya leaves can help facilitate the digestive process naturally and is very effective in breaking down proteins, helping to regulate amino acids and remove toxins from the body of livestock and helping to clean the digestive tract (Susanto et al., 2022). Papaya leaf extract also has active compounds with **anti-inflammatory** and **antioxidant properties,** such as flavonoids, saponins, and tannins. These anti-inflammatory properties can help reduce inflammation in the digestive tract, thus supporting the digestive system as a whole (Sugito and Suwandi, 2017). If the intestine is in a healthier condition and free of inflammation, the process of processing coarse fiber can run more smoothly, although it does not directly affect how coarse fiber is broken down.

Temulawak extract contains bioactive compounds such as curcumin and xanthorrhizole, which have anti-inflammatory properties and stimulate the production of digestive enzymes (Syamsudin et al., 2019). By increasing the production of these enzymes, curcuma helps break down coarse fiber in the intestines, thereby increasing the pig's ability to digest fiber and utilize the nutrients present in the feed.

Ginger extract contains bioactive compounds such as gingerol and shogaol, which can stimulate the production of digestive enzymes, including enzymes that break down complex carbohydrates and fibers namely cellulase and hemicellulase. With the increase in the activity of digestive enzymes, the efficiency of crude fiber absorption can be optimal Azkiyah, (2020). Sambiloto extract contains **the andrographolide** compound Sulistyowati, (2023). Which has anti-inflammatory, antioxidant, and anti- microbial properties. These compounds can help calm inflammation in the digestive tract and support gut health, which is important in the processing of foods rich in crude fiber.

Effect of Treatment on Crude Fat Consumption

The highest average crude fat consumption was observed in cattle that received H3 treatment, which was 145.43 grams/head/day, followed consecutively by cattle that received H2 treatment of 137.56 grams/head/day, H1 of 130.28 grams/head/day and the lowest average ration consumption was obtained by cattle that received H0 treatment, which was 118.93 grams/head/day. The average treatment of crude fat consumption is presented in Table 7.

Table 7. Average gross fat consumption of research cattle (grams/head/day)

Group	Treatment				Total	Average
	H0	H1	H2	H3		
I	108,41	132,02	134,64	147,76	522,85	130,71
II	123,28	125,90	134,64	147,76	531,60	132,90
III	125,08	132,90	143,39	140,76	542,15	135,54
Total	356,79	390,83	412,69	436,30		
Average	118,93^{a}	130,28^{ab}	137,56^{bc}	145,43^{c}		133,05

Description: Mean values with different superscripts on the same row indicate significant differences (P<0.01).

The results of the variety analysis (Anova) showed that the treatment had a very significant effect (P<0.01) on the consumption of crude fat in the stud y livestock. Duncan's further test results showed that between the H3:H2, H2:H0, H2:H1 and H1:H0 treatments, they were not noticeable (P<0.05), H3:H1 showed a noticeable difference (P<0.05) while the H3:H0 treatment was very pronounced (P<0.01). The use of 15 and 20% fermented herbal ingredients in different rations was very pronounced compared to no fermented herbs H0 against the consumption of crude fat in experimental pigs.

There is a noticeable influence on the consumption of crude fat in experimental pigs due to the influence of fermented herbal ingredients such as ginger extract can stimulate the enzyme lipase, which plays a role in the breakdown of fat in the intestines. With

increased activity of the lipase enzyme, the efficiency of fat digestion can be increased. Moringa leaf extract can improve feed quality and improve digestive efficiency (Dacomo et al., 2020).

Moringa leaves are rich in protein content, which can help increase the efficiency of feed use by pigs. The increased efficiency of this feed can affect fat absorption and metabolism. Garlic contains flavonoids that act as anticholesterol. Garlic can increase the activity of digestive enzymes, such as lipase, which play a role in fat digestion. This can increase the absorption and utilization of fats in feed. Garlic also has antioxidant properties that can protect the cells of the livestock body from oxidative damage caused by saturated fats in feed.

Sambiloto extract is often used in traditional medicine to support liver function (Yanti and Mitika., 2017). Sambiloto has hepatoprotective (liver-protecting) properties. The liver is the main organ that plays a role in fat metabolism. Temulawak has hepatoprotective properties, which can support liver health (Syafitri, 2019). The liver plays an important role in fat metabolism, including the breakdown and utilization of crude fats. By supporting liver function, curcuma can help improve fat metabolism, so that the digestion and absorption of crude fats from feed is more efficient.

Effect of Treatment on Digestibility of Crude Fiber

The highest average gross fiber consumption was observed in cattle that received H3 treatment, which was 97.13 grams/head/day, followed consecutively by cattle that received H2 treatment of 95.02 grams/head/day, H1 of 92.44 grams/head/day and the lowest average ration consumption was obtained by cattle that received H0 treatment, which was 89.68 grams/head/day. The average digestibility of crude fiber is presented in Table 8.

Table 8. Average digestibility of crude fibre of treated cattle (grams/head/day)

Group	Treatment				Total	Average
	H0	H1	H2	H3		
I	87,89	90,80	94,86	95,99	369,574	92,39
II	88,95	90,15	93,50	97,18	369,807	92,45
III	92,18	96,35	96,68	98,21	383,436	95,86
Total	269,04	277,32	285,06	291,40		
Average	89,68[a]	92,44[ab]	95,02[bc]	97,13[c]		93,57

Description: Mean values with different superscripts on the same row indicate significant differences (P<0.01).

The results of the variety analysis (Anova) showed that the treatment had a very significant effect (P<0.01) on the digestibility of coarse fiber rations. Duncan's further test showed that between the H3:H2, H2:H0, H2:H1 and H1:H0 treatments were not noticeable (P<0.05), H3:H1 showed a noticeable difference (P<0.05) while the H3:H0 treatment was very noticeable (P<0.01). The use of 15 and 20% fermented herbal ingredients in different rations was very pronounced compared to no fermented herbs H0 on the digestibility of crude fiber in experimental pigs.

The digestibility of crude fiber is influenced by the composition of crude fiber and the chemical content of other nutrients, there is a reciprocal relationship between the crude fiber of the ration and the digestibility coefficient of nutrients. The digestion of crude fiber in pigs also affects the digestion of crude fat. If crude fat consumption increases, digestibility also increases, and vice versa (Ngenes et al., 2021). The higher the level of crude fiber in the ration, the lower the nutrient digestion coefficient (Frida et al., 2020). The high content of crude fiber in the ration affects the digestibility and consumption of the ration and affects the use of food. In addition to the composition of coarse fiber content, a factor that affects the digestibility of coarse fiber is the activity of microorganisms. The digestibility of coarse fiber in feed materials can be influenced by several factors, namely the coarse fiber substances contained in feed and the content of coarse fiber, cellulose, hemicellulose, lignin and polysaccharides (Darsan et al., 2023).

Sambiloto extract is rich in the active compound **andrographolide**, which has good anti-inflammatory properties for pigs, poor digestion of coarse fiber is often associated with inflammation or irritation of the gastrointestinal tract Huda, (2017). The administration of sambiloto extract can help reduce inflammation in the intestines of pigs, so that the digestive system is more optimal, and can improve the ability of pigs to process coarse fiber, even though coarse fiber cannot be fully digested by pig enzymes. Ginger extract contains active compounds such as **gingerol and shogaol**, which have anti-inflammatory effects. In pigs,

not all crude fiber can be digested because pigs are monogastric (single-bellied) animals, but crude fiber is still important for digestive health (Anggista, 2018). Moringa leaf extract contains enzymes such as amylase, protease, and lipase in moringa leaves that can help digestion and absorption, thereby supporting the efficiency of feed utilization (Nanaryain, 2016). This allows pigs to make better use of the energy and nutrients from feed, especially the benefits of the digestibility of coarse fiber even if it is not fully digested. Moringa also contains anti-inflammatory substances that can help **reduce inflammation in the digestive tract**, improve

intestinal conditions, and support a more efficient digestive process (Nanaryain, 2016). With reduced inflammation, pigs will be better able to process coarse-fiber feed without experiencing digestive problems such as intestinal irritation or constipation.

Effect of Treatment on Crude Fat Digestion

The highest average crude fat digestibility was observed in cattle that received H3 treatment, which was 81.67 grams/head/day, then successively followed by cattle that received H2 treatment of 76.86 grams/head/day, H1 of 73.27 grams/head/day and the lowest average digestibility of crude fat obtained by cattle that received H0 treatment which was 72.92 grams/head/day. The average treatment of crude fat digestion is presented in Table 9.

Table 9. Average digestibility of crude fat in research cattle (grams/head/day)

Kelompok	Perlakuan				Total	Average
	H0	H1	H2	H3		
I	72,68	72,55	76,35	80,42	302,02	75,51
II	72,86	73,05	76,22	81,64	303,79	75,95
III	73,20	74,21	77,98	82,93	308,34	77,09
Total	218,76	219,82	230,58	245,01		
Average	72,92^{ab}	73,27^{b}	76,86^{bc}	81,67^{c}		76,18

Description: Mean values with different superscripts on the same row indicate significant differences (P<0.01).

The results of the variety-assortment analysis (Anova) showed that the treatment had a very pronounced effect (P<0.01) on the digestibility of crude fats. Duncan's follow-up test showed that between the H3:H2, H2:H0, H2:H1 and H1:H0 treatments, there were differences between H3:H2 and H1:H0 (P<0.05), H3:H1 showed a noticeable difference (P<0.05) while the H3:H0 treatment was very pronounced (P<0.01). The use of 15 and 20% fermented herbal ingredients in different rations was very pronounced compared to no fermented herbs H0 on the digestibility of crude fat in experimental pigs.

The results of this study show that there is a very real influence on the digestion of crude fats along with the increasing use of fermented herbal ingredients in experimental livestock rations. This is because of the content of fermented herbal ingredients that are able to increase the digestion of crude fats. The treatment of using fermented herbal ingredients in rations has a very real effect on the digestibility of crude fats. The existence of a real influence on the digestibility of crude fat is suspected to be due to the influence of the content of fermented herbal ingredients such as Sambiloto extract which contains Andrografolida compounds can help improve liver and bile function Elisabeth et al. (2022).

More optimal bile production can help increase fat emulsification, making it easier to be digested by lipase enzymes. The anti-inflammatory content in sambiloto can help reduce inflammation in the digestive tract. Sambiloto also has antimicrobial properties that can maintain the health of the digestive tract, so that the absorption of nutrients is more optimal, including crude fats. Temulawak has various bioactive compounds, such as curcumin, which have anti-inflammatory, antioxidant properties, and support digestive and liver function Rosidi et al. (2014). Garlic extract has antimicrobial properties that can reduce the population of pathogenic bacteria in the digestive tract and support the absorption of nutrients, including fats. Garlic contains sulfur compounds such as allicin can stimulate the secretion of digestive enzymes and bile Retma et al. (2022). Garlic can reduce fat accumulation in the body by regulating lipid metabolism, which indirectly helps the utilization of fat in feed more efficiently. Papaya leaves have antioxidant properties that can support the health of the digestive system and liver function. Papaya leaves also have antimicrobial properties that can help maintain the balance of microflora in the digestive tract. Moringa leaves are rich in antioxidant compounds such as flavonoids, vitamin C, and beta-carotene, which can help improve the health of the digestive system and fat metabolism Moruk et al. (2023). Antioxidants can protect the body's cells from oxidative stress and support liver function, which plays an important role in fat metabolism.

CONCLUSION

Based on the results of the study, it can be concluded that the use of fermented herbal ingredients in the basal ration at the level of 20% is able to increase the consumption of crude fiber and crude fat, digestibility of crude fiber and crude fat of landrace landrace pig livestock.

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