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Effect of Fermented Putak Waste toward Broiler Performance

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Abstract: Purpose of this study was to determine utilization of non fermented and fermented putak waste as one of local feed to improve broiler production. Method of this study was using in vivo trial method with nested pattern of Complete Random Design. First factor is non fermented putak waste P0: non fermented putak waste, while P1: fermented putak waste is the second factor. Measured parameter in performance is feed consumption, body weight increment, feed conversion and income over feed cost (IOFC). Result of this study concerning effect in utilization of non-fermented and fermented putak waste has showed very significant difference (P<0,01) toward body weight increment, feed conversion and IOFC and non-significant difference (P>0,05) toward feed consumption, while effect of using non fermented and fermented putak waste showed significant difference (P<0,01) toward feed consumption, body weight increment, feed conversion and IOFC.
Keywords: Putak waste, fermentation, performance.

INTRODUCTION

Putak is the potential energy source for feed which available in Timor Leste with availability spread over regions that produce putak. However, its use as one of the feed composition was not yet realized, particularly for putak waste.

Poultry is type of animal which cannot digest feed with high coarse fiber, therefore effort should be done to reduce fiber content in putak.

Disadvantage of putak was its nutrient composition whereas it has low coarse protein and high coarse fiber, thus good processing should be done to improve its composition through effective and efficient technology. One of the simple ways to do this was by using fermentation technology.

Fermentation using *Aspergillus niger* to putak flour shows high increase of coarse protein content, followed by the increasing of pure protein content from fermented putak with 3,25 vs 12,53% [1]. *Saccharomyces cereviseae* also could improve nutrient content such as protein [2].

Alternative for artificial feed can be done by utilizing local feed as basic feed for poultry, by using fermented putak waste. Composing animal feed using putak waste was expected to be able to fulfill poultry nutritional needs such as carbohydrate, protein, fat, fiber, mineral and vitamin.

Based on the statement above, there was the need to scientifically review and evaluate putak waste as feed, by using *Aspergillus niger* inoculums, *Saccharomyces cerevisiae* inoculums and combination of both inoculums, which incubated in different time, and its implication toward broiler's feed viewed from its appearance such as feed consumption, body weight, conversion and income over feed cost (IOFC).

MATERIALS AND METHODS

This study used 180 DOC broiler, putak waste from prior study and other feed composition such as corn, MBM, soybean residue, bran and mineral. Cage and cage equipment, feed and water container, bench scale, and room thermometer were also used.

Study method used was *in vivo* trial with nested pattern of Complete Random Design (CRD) consists of two factor, first factor was putak waste without fermentation (P0) and with fermentation (P1) using *Aspergillus niger* and *Saccharomyces cereviseae* and second factor was different percentage used which consists of 0% (L0), 5% (L1), 10% (L2), 15% (L3) and 20% (L4). Each factor was replicated 3 times with 6 broiler in each replication. Treatments used in this study were as follows:

P0L0 = 0% putak waste without fermentation
P0L1 = 5% putak waste without fermentation
P0L2 = 10% putak waste without fermentation
P0L3 = 15% putak waste without fermentation
P0L4 = 20% putak waste without fermentation
P1L0 = 0% putak waste with fermentation
P1L1 = 5% putak waste with fermentation
P1L2 = 10% putak waste with fermentation
P1L3 = 15% putak waste with fermentation

P1L4 = 20% putak waste with fermentation
Each treatment was replicated 3 times.

Variables measured were feed consumption, body weight increment, feed conversion and IOFC.

RESULTS AND DISCUSSION

Effect in treatments using fermented and non-fermented putak waste toward broiler performance

Statistical analysis result showed that treatments did not give significant difference (P>0,05) toward feed consumption. This occurs because energy content from fermented and non-fermented putak waste was similar, each chicken would consume energy according to its needs and each feed treatment has similar nutritional value. Other reason might be because feed and environment would influence feed consumption. Fermentation treatment using *Aspergillus niger* and *Saccharomyces cereviseae* inoculum in putak waste did not affec its physical trait such as aroma which affect feed palatability and thus did not affect feed consumption. Result showed that feed consumption in P0 and P1 was 3443, 52 and 3495,74 g/chicken. Hasan *et al.*, [3] suggest that consumption standard of cumulative feed from PT. Charoen Pokphand was 3297 g for 35 days. Result of this study was higher than those found in Ramli *et al.*, [4] with mean of broiler feed consumption during 4 week care was 1783,47 – 1813,95 g/chicken.

Table-1: Effect of fermented putak waste toward broiler performance

Treatments	Consumption (g/chicken)	PBB (g/chicken)	Feed conversion	IOFC (Rp)
P0	3443,52±169,85	1783,11±105,60^{A}	1,94±0,18^{B}	8829,6±1836,1^{A}
P1	3495,74±181,76	2028,51±176,59^{B}	1,73±0,11^{A}	13286,8±2357,2^{B}

Note: Different $^{A, B}$ superscript in the same column shows very significant difference (P<0,01), P0: putak waste without fermentation and P1: putak waste with fermentation under combination of *Aspergillus niger* and *Saccharomyces cerevisease* inoculums after incubated for 72 hours.

Non fermented and fermented putak waste has no effect toward food consumption, this indicate that putak waste did not influence feed palatability. This result was in line with those of Kompiang [5] who suggest that fermented sago waste did not give significant effect toward feed consumption and that sago waste did not create palatability issue. Simanjuntak *et al*., [6] suggest that amount of feed consumption would depend on palatability, dry substance content, type of feed and animal's health. Saptoningsih [7] in Hehanussa *et al*., [8] suggest that fermented substance would be more palatable for animal since during fermentation process enzymes would break down complex compound into simpler molecules so that it was more digestible and also it would change its aroma and taste to become better than its original form.

Statistical analysis result showed that treatments has give very significant difference (P<0,01) toward broiler's body weight increment. This might be because each feed has similar nutritional value however, value in non-fermented putak waste (P0) was still lower than those of fermented putak waste (P1) thus P0 still contain high fiber content and making it less digestible with low protein content. Therefore, it might affect its body weight increment. With fermentation, it would improve coarse protein content from 3,33% to 11,02% in which fermentation process would increase digestibility of feed protein thus feed protein would be converse into meat and broiler's body weight would increase. This was in line with Budiansyah [9] who suggest that coarse protein is food substance was highly needed for tissue growth, while coarse fiber could reduce nutrition availability needed for growth. Fermentation in this study was using combination of *Saccharomyces cereviseae* and *Aspergillus Niger* inoculum to improve dissolved protein in putak waste, in which fermentation activity by both inoculums was able to change the protein into simple amino acid due to proteolitic bacteria [7]. This amino acid would be used in meat formation. Fermented putak waste (P1) has lower coarse fiber and coarse protein also higher dissolved protein after being fermented by *Aspergillus niger* and *Saccharomyces cerevisieae*. This showed that fermented feed by both inoculum was able to increase digestibility and increase body weight increment. It indicates body weight increment was proportional with feed input that contain good nutrition. This was as stated by Simanjuntak [6] who said that body weight increment was influenced by nutrition or feed input particularly protein obtained from feed consumption.

Feed which use fermented putak waste with *Aspergillus niger* and *Saccharomyces cerevisieae* contain protein which consists of nucleic acid fraction from microbes cells to increase broiler's body weight. This was in oppose to Kuswanto [10] in Budiansyah [9] who suggest that some coarse protein after fermentation was originated from nucleic acid. This protein was hard to digest thus protein for growth was lowered. Broiler's body weight in 35 days of observation in this study was higher than result obtained by Scott *et al.*, [11] in Budiansyah [9] who suggest that broiler's body weight in 35 days old were range between 900 – 1100 g.

Study results for putak waste with and without fermentation toward broiler final weight in P0 and P1 were 1783,11 and 2028, 51 g. This result was the same with result from Atmomarsono [25] in Hasan *et al*., [3] that broiler has high productivity because in 35 days old would have 1,75 – 2 kg weight. Broiler's body weight was influenced by several factors such as: genetic, sex, feed's protein content, temperature in cage management, and sanitation [12, 3]. Study by Setiawan and Sujana [13] in Hasan *et al*., [3] suggest that final body weight for broiler after 21 to 42 days old was ranged between 1020,00 – 2370,00 g, thus this study results was considered normal according to this statement.

Statistical analysis result showed that treatments has give very significant difference (P<0,01) toward broiler's feed conversion, however, P0 feed conversion value was higher than P1 feed conversion value. This might be because P0 was not consumed efficiently and it has less digestibility for broiler. Feed conversion for P0 (1,94) in this study was similar to those obtain by Kompiang [5] with fermented sago waste (1,92) and it was higher than result obtain for P1 (1,73). Higher feed conversion value means more feed was needed to increase body weight while lower feed conversion value means that feed quality was better. Result in treatment using putak waste for feed conversion in this study was lower than those obtain by Mandey *et al.*, [14] whereas feed conversion using sweet potato leaves for broiler feed was ranged between 2,83 – 2,91. Result in this study showed that broiler's feed conversion in P1 after 35 days give lower value than those reported by Bintang *et al*., [15] and Sinurat *et al*., [16] in Bintang *et al.*, [17] who suggest that broiler with feed containing aloe vera has conversion value 1,74 and 1,78 for the same age.

Improvement in feed conversion value was one of the important targets for commercial poultry nutrition. If feed conversion value was higher, it implies that feed efficiency was poor and it occur due to low feed consumption followed by lower body weight and digestibility. The indication showed that chicken has able to determine its own nutrient needs other than its energy needs. This was in line with Kompiang [5] who suggest that difference between selected feed would lies on its protein content, therefore it can be concluded that chicken was able to determine its protein needs.

Advantage in raising broiler for 35 days with local feed from putak waste has shown very significant difference (P<0,01) toward IOFC, with statistical analysis result shown on Appendix 4 (4). This advantage was more likely because local feed was inexpensive. IOFC value in P0 was lower than P1, this might be due to P1 body weight was higher due to more efficient use of fermented putak waste with better nutritional value compared to non fermented putak waste. This was in line with study of Praptiwi [18] who suggest that imported feed would be costly compare to local feed with similar harvesting time. Increasing IOFC in this study was caused by decreasing feed consumption toward local feed (made from putak waste as supplement for complete feed) in order to obtain profit. Rasyaf [19] in Gustira *et al*., [20] suggest that increasing IOFC value was better because increasing IOFC value means income from chicken sold was also increasing.

Effect of using fermented putak waste toward broiler performance

Giving non fermented and fermented putak waste has very significant difference (P<0,01) toward consumption. Broiler consumption after 35 days using non fermented putak waste was ranged between 3342,94 – 3664,78 (g/chicken) and fermented putak waste was ranged between 3452,48 – 3728,70 (g/chicken). This might occur because non fermented and fermented putak waste could give good palatability and due to its feeding procedure, in which when there was some food residue it would be mixed with new feed in feeding container so that its aroma would still attractive for broiler. Broiler consumption in all level of putak waste (5,10, 15, and 20%) without fermentation and with fermentation was all higher than control.

Utilization of putak waste either fermented or non-fermented until 20% did not affect the decreasing feed consumption and there was no other factor that influences the decreasing feed consumption. This means, utilization of putak waste as addition in broiler feed was safe for consumption.

Utilization of 15% non-fermented putak waste toward feed consumption tend to be higher than 20% treatments, it means more non fermented putak waste would decrease feed consumption while 20% fermented putak waste would increase feed consumption which means level of utilization did not give constant result.

Utilization of non fermented (P0) and fermented (P1) putak waste has give very significant difference (P<0,01) toward body weight increment of broiler. This might occur because feed was having similar nutrient value, however 5% P0 (L1) has higher body weight than 10% level (L2), 15% level (L3) and

20% level (L4). This probably due to 5% putak waste has lower coarse fiber thus did not affect digestive process while in 10% level P1 (L2), it give better result. It was probably because *Aspergillus niger* and *Saccharomyces cereviseae* has already loosened fiber binding in putak waste during fermentation, thus making it easier to digest. Result of this study was quite good in non fermented (P0) and fermented (P1) putak waste. Broiler body weight increment in this study was higher than in study by Budiansyah [9] who suggest that either non fermented and fermented coconut residue in 10-20% would give body weight increment about 1449,4 g (10%), 1391,7 g (20% and 1432,1 g (10%), 1382,8 g (20%) respectively. Study by Setiawan and Sujana [13] in Hasan *et al*., [3] suggest that final body weight of broiler after 21 to 42 days was ranged between 1020,00 – 2370,00 g. Compared to final body weight obtained in this study it was considered normal.

Utilization of non fermented and fermented putak waste in 15% level toward body weight increment in this study obtained higher result than in study by Suryana [21] which suggest that using 15% boiled sago as feed for broiler would increase body weight about 1658,5 g/chicken after 42 days.

Treatment using non fermented putak waste in 15% level tends to be higher than in 20% level. It means higher utilization of putak waste would decrease body weight. Meanwhile, utilization of fermented putak waste in 15% level tend to be higher than in 20% level, it means more fermented putak waste would decrease body weight.

Table-2: Effect in utilization of non fermented and fermented putak waste toward broiler performance

Treatments		Consumption (g/chicken)	PBB (g/chicken)	Feed conversion	IOFC (Rp)
P0	L0	3223,40±86,28^{A}	1782,49±94,91^{A}	1,81±0,14^{A}	7992,68±1550,3^{AB}
	L1	3342,94±66,66^{B}	1905,39±75,66^{B}	1,76±0,06^{A}	11347,6±972,6^{B}
	L2	3471,33±79,04^{C}	1794,28±135,27^{B}	1,89±0,05^{A}	9330,8±1688,1^{AB}
	L3	3664,78±88,17^{D}	1713,94±37,51^{A}	2,14±0,10^{B}	7436,5±1013,8^{A}
	L4	3515,17±76,68^{C}	1677,94±71,42^{A}	2,10±0,11^{B}	8040,6±1261,2^{AB}
P1	L0	3213,77±30,71^{A}	1754,44±73,53^{A}	1,83±0,08^{B}	10752,16±1543,8^{A}
	L1	3452,48±84,92^{B}	2017,91±92,05^{B}	1,71±0,04^{B}	12734,9±2489,9^{AB}
	L2	3522,94±72,58^{B}	2236,36±92,61^{C}	1,58±0,04^{A}	16015,4±2046,6^{B}
	L3	3561,00±35,92^{B}	2082,00±69,97^{BC}	1,71±0,08^{B}	13973,8±1239,8^{AB}
	L4	3728,7±75,65^{C}	2051,83±90,52^{B}	1,82±0,10^{B}	12957,7±1566,5^{AB}

Note: Different $^{A,B, AB, C, D}$ superscript in the same column shows very significant difference (P<0,01)

Feed conversion in putak waste level P0 and P1 has very significant effect (P<0,01), however, feed conversion in P0 putak waste was higher (particularly in level L3 = 2,14). This might be influenced by lower nutrient content in feed due to high coarse fiber and low coarse protein thus higher level of utilization would decrease feed conversion value. Result in P0 treatment of this study was still better compared to result of study by Mujiasih [22] who suggest that various level (0,1%, 0,2% and 0,3%) from pro biotic utilization, *Bacillus* spp, in broiler feed showed the lowest feed conversion value of 2,22 in 5 weeks trials. In this study, lowest feed conversion in P1 occur in level L2 = 1,58 due to fermented feed has high coarse protein content and low coarse fiber, thus digestibility was still quite good in this level. This was in line with Unigwe *et al.*, [23] suggested that utilization of 5% sweet potato leaves in broiler feed could increase feed conversion and body weight. Utilization of 15% fermented and non fermented putak waste in broiler feed has higher feed conversion than result obtained by Suryana [21] who used 15% boiled sago as broiler feed and showed feed conversion of 1,7 in 42 days.

Utilization of 5% non fermented putak waste tend to lower compared to 20% level, which means that using more non fermented putak waste would increase feed conversion. Meanwhile, 10% fermented putak waste tend to lower compared 20$ level, which means that using more fermented putak waste would increase feed conversion.

Based on statistical analysis result, effect of utilization of putak waste has give very significant difference (P<0,01) toward IOFC, this might be due to lower feed conversion as the result of good use of putak waste by broiler chicken. Lower IOFC value obtained in each P0 level might be influenced by low body weight because non-fermented putak waste were used. Higher P0 level would has higher coarse fiber so that broiler did not able to digest and might cause low body weight and low selling price, but in overall it was still profitable. Suppressing feed cost might be due to two aspects, technological aspect and commerce aspect. Technological aspect showed the standard of nutrient needs while commerce in animal feed also play an important role, such as in commerce of raw material for animal feed [24, 18].

Utilization of 5% non-fermented putak waste tend to be higher than 20% level, which means that using more non fermented putak waste would lower

IOFC value. Meanwhile, 10% fermented putak waste tend to be higher than 20%, which means that using more fermented putak waste would lower IOFC value.

CONCLUSIONS

1. Treatment using fermented putak waste would increase broiler performance compared to using non fermented putak waste.
2. 5% level of non fermented putak waste and 10% level of fermented putak waste could improve broiler performance.

SUGGESTIONS

1. Fermented putak waste could be use as broiler feed.
2. Utilization of 5% and 10% level of non-fermented and fermented putak waste can be used as guidance to compose broiler feed.

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