Carcass Percentage and Abdominal Fat Percentage of Broiler Chickens Fed Pineapple Waste Meal Fermented by "Ragi Tape" in Diet

Jet S. Mandey[1*], Bernat Tulung[1], Jein R. Leke[2]

[1]*Animal Nutrition Department, Animal Husbandry Faculty, Sam Ratulangi University*
[2]*Animal Production Department, Animal Husbandry Faculty, Sam Ratulangi University*
*Jl. Kampus Selatan, Manado 95115, ** jetsm_fapet@yahoo.co.id; rinileke@yahoo.com,

Abstract

In the prospect of pineapple waste that rich in crude fiber and calcium for broiler feedstuff, a study was carried out to determine the effect of pineapple waste meal that was fermented by "ragi tape" (PWF) on carcass percentage and abdominal fat percentage of broilers. "Ragi tape' was a traditional commercial product contained *Candida parapsicosis, Candida melinis, Hansenula supbeliculosa, Hansenula malanga, Aspergillus niger, A. oryzae* and *Saccharomyces cerevisiae*. Five dietary treatments containing 0, 5, 10, 15 and 20% levels of PWF with four replicates were fed to 100 broiler chickens for 35 days in a completely randomized design. Feed and water were provided *ad libitum*. The results showed that carcass percentage and abdominal fat percentage were highly significant ($P<0.01$) affected by dietary treatments. Carcass percentage was significant decrease in the proportion of 15% and 20% of PWF. However, the carcass percentage in treatments R0 – R4 were still in a good category. Abdominal fat percentage also was significant decrease in the proportion of 15% and 20% of PWF. The higher the levels of PWF the lower the abdominal fat percentage signed that PWF treatments up to 20% resulted good category of broiler carcass. It can be concluded that PWF can be fed to broiler chickens at up to 20% level with a promising good category of broiler carcass.

Keywords: Broiler, Carcass, Fat, Fermentation, Pineapple Waste

Introduction

A major strategy to develop the livestock industry in developing countries could be the use of agricultural by – products like pineapple waste, corn cobs and brewers dry grain (Onwuka, *et al*., 1997). Pineapple waste is agro by-products from pineapple fruit. Pineapple waste occurs as pineapple peels and core, making about 40-50% of the fresh fruit (Buckle, 1989). It contains mainly the sugars of sucrose, fructose and glucose (Krueger, *et al*., 1992). Also, it contains low amounts of protein, fat, ash (Hebbar, *et al*., 2008). Pineapple peel is rich in cellulose, hemicellulose and other carbohydrates. Raw pineapple waste (on DM basis) contains 4−8% crude protein, 60−72% NDF, 40−75% soluble sugars (70% sucrose, 20% glucose and 10% fructose) as well as pectin, but it is poor in minerals (Muller, 1978; Pereira, *et al.*, 2009), except Ca. It is locally available.

The accumulation of pineapple waste in the neighborhoods constitutes a source of environmental pollution. If fresh pineapple peels are not consumed, it often gets mouldy and sour, and therefore unlikely to be used as an animal feedstuff. Problems related with the fresh form, were overcome by the sun drying technique of pineapple peels developed by Aboh, *et al*. (2004). It gave dried peels of good quality, however, the dried peels are too compact and hard for its ingestion by animals.

*) Diseminarkan dalam International Conference on Food, Agriculture and Culinary Tourism 2015. Samarinda, 4-6 Agustus 2015.

Researchers reported that pineapple wastes have been described as equivalent to cereal grains for ruminants (Müller, 1978) or as a low-nutrient feed (Hepton and Hodgson, 2003). In any case, the high amount of fibre makes pineapple wastes more suitable to ruminants than to pigs and poultry. The bulkiness of the fresh products limits intake. Inclusion of 15 percent pineapple bran in chick diets depressed the feed conversion ratio and 20 percent inclusion decreased weight (Hutagalung, *et al*., 1973). The final average live weight gains and feed conversion rate of growing rabbits significantly reduced as inclusion level of pineapple waste increased (Fapohunda, *et al*., 2008; Adeyemi, *et al*., 2010). However, Lamidi, *et al*. (2008) found that broiler chickens could tolerate up to 10% pineapple waste in their diets without any deleterious effect. Olosunde (2010) reported that sheep could tolerate up to 45% pineapple waste but 30% was superior when substituted for corn bran.Therefore, to overcome this constraint, it is significant to explore some treatments to be applied to the peels such as crushing, to improve their ingestion without degrading the feedstuff value.

Some studies were conducted to develop a procedure for converting pineapple waste into animal feed (Makinde, *et al*., 2011; Sruamsiri, *et al*., 2007). In studies by Correia, *et al*. (2004), *Rhizopus oligosporous* was used to produce enhanced levels of free phenolics from pineapple residue in combination with soy flour as potential nitrogen source. "Ragi tape" was a traditional commercial product contained *Candida parapsicosis*, *Candida melinis*, *Hansenula supbeliculosa*, *Hansenula malanga*, *Aspergillus niger*, *A. oryzae* and *Saccharomyces cerevisiae*, that was could used to develop a procedure for converting pineapple waste into animal feed. However, there are no reported studies of the dietary of fermented pineapple waste in diet of broiler. This study aimed to investigate the effect of the dietary level of pineapple waste fermented by "ragi tape" on carcass percentage and abdominal fat percentage of broiler chickens.

Materials and Methods

Experimental Diets

Fresh pineapple peels collected was sun-dried at an average temperature of 30 °C on a concrete floor for ten days with constant turning until a constant weight was obtained. Part of the peels then was ground to fine powder using mortar and pestle, then milled and mixed with "ragi tape" to incubate on 3 days. "Ragi tape' was a traditional commercial product contained *Candida parapsicosis*, *Candida melinis*, *Hansenula supbeliculosa*, *Hansenula malanga*, *Aspergillus niger*, *A. oryzae* and *Saccharomyces cerevisiae*. The fermented pineapple waste (PWF) contains protein 7.87%, crude fiber 17.42%, fat 1.53%, Ca 12.73%, P 0.82% and GE 3830 Kcal/kg. It was then incorporated into the experimental diets at five levels of 0, 5, 10 and 15 and 20%. Based diet and PWF were crushed to obtain diets R0, R1, R2, R3 and R4, respectively. Based diet contain ingredients: yellow corn 55%, fish meal 12%, soybean cake 15%, rice bran 7%, coconut cake 10.5% and top mix 0.5% (Table 1).

A total of 100 unsexed broiler finisher (Cobb CP 707) have been used in this experiment. Feed and water were provided *ad libitum* throughout experiment, and these treatments were administrated for a 28 days period.

Parameters were evaluated: carcass percentage and abdominal fat percentage. At 29 days the experiment, one representative bird from each pen was conventionaly sacrified by cervical dislocation technique, as described in the Report of the AVMA Panel on Euthanasia (AVMA, 2001) and its carcass parameters (ready to cook) including dressing percentage and abdominal fat were determined.

Statistical analysis

The data were subjected to analyze for a variance technique using completely randomized design (CRD) that was employed in one-way analysis of variance, and significant differences compared by honestly significant difference (HSD) test (Snedecor and Cochran, 1967). All of statement of differences were performed at significance levels of 1% and 5%.

TABLE 1. DIETS AND CALCULATED ANALYSIS

Treatments	R0	R1	R2	R3	R4
Based Diet	100	95	90	85	80
PWF	0	5	10	15	20
Calculated Analysis:					
Protein	21.85	21.15	20.45	19.75	19.05
Crude Fiber	4.86	5.48	6.11	6.74	7.37
Fat	6.32	6.08	5.84	5.60	5.37
Ca	2.31	2.83	3.35	3.87	4.40
P	1.27	1.25	1.22	1.20	1.18
ME (Kcl/kg)	3883	3880	3878	3875	3872

Notes: PWF = Fermented pineapple waste

Results and Discussion

Data on carcass percentage and abdominal fat percentage of broilers affected by fermented pineapple waste (PWF) in diet is shown in Table 2.

TABLE 2. EFFECT OF FERMENTED PINEAPPLE WASTE IN DIET ON CARCASS PERCENTAGE AND ABDOMINAL FAT PERCENTAGE OF BROILERS

Variable	Treatments				
	R0	R1	R2	R3	R4
Feed Intake (g/h/d)	87.25 ± 3.74^{a}	91.28 ± 2.13^{b}	93.09 ± 2.83^{b}	98.69 ± 3.10^{c}	100.21 ± 3.44^{c}
Carcass (%)	75.18 ± 1.73^{a}	73.23 ± 1.61^{ab}	72.82 ± 1.23^{ab}	72.13 ± 1.72^{b}	70.75 ± 1.62^{c}
Abdominal Fat (%)	2.32 ± 0.13^{a}	1.74 ± 0.14^{b}	1.50 ± 0.11^{c}	1.30 ± 0.07^{d}	1.21 ± 0.13^{d}

Notes: g/h/d = gram/head/day; ^{abcd} means with the same letters on the same row are in not significantly difference ($P>0.05$)

The results showed that carcass percentage and abdominal fat percentage were highly significant ($P<0.01$) affected by dietary treatments. Carcass percentage was significantly decrease in the proportion of 15% and 20% of PWF. However, the carcass percentage in treatments R0 – R4 were still in a good category. Abdominal fat percentage also was significant decrease in the proportion of 15% and 20% of PWF.

In the case of unfermented pineapple waste, Aboh, *et al*. (2013) reported that final average live weight gains and feed conversion rate of growing rabbits significantly reduced as inclusion level of pineapple peels increased. Moreover, Adeyemi, *et al*. (2010) and Fapohunda, *et al*. (2008) observed the same trend when using pineapple peels in the rabbits feed. The difference may due to the nutrient unbalance, mainly the protein contents of diets, and based on unfermented pineapple peel. In the present study, the fermented pineapple peel crude protein value obtained was higher than the value recorded (5.11%) by Adeyemi et al. (2010), resulted good category of broiler carcass.

The decreasing of abdominal fat in the present study may due to th Ca content in diet. Some reports suggest that high dietary Ca can adversely affect the utilisation of fat (Sibbald and Price, 1977), nitrogen and metabolisable energy (Shafey and McDonald, 1991) in broilers. Dietary Ca concentration had a significant effect on apparent fat digestibility. Fat digestibility was reduced by increasing Ca concentrations in all intestinal segments (Mutucumarana, *et al*., 2013). Abo, *et al*. (2013) got the values of the ash, calcium and magnesium recorded from sun dry pineapple peel indicated that it is a useful mineral source for rabbits. In this experiment, the higher the levels of PWF the lower the abdominal fat percentage signed that PWF treatments up to 20% resulted good category of broiler carcass.

Conclusion

Carcass percentage was significant decrease in the proportion of 15% and 20% of PWF. However, the carcass percentage in treatments R0 – R4 were still in a good category, and abdominal fat percentage also was significant decrease in the proportion of 15% and 20% of PWF. The higher the levels of PWF the lower the abdominal fat percentage signed that PWF treatments up to 20% resulted good category of broiler carcass. It can be concluded that fermented pineapple waste can be fed to broiler chickens at up to 20% level with a promising good category of broiler carcass.

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