

# THE EFFECT OF EXPIRED BREAD MEAL AS CORN SUBSTITUTION IN DIET ON BROILER PERFORMANCE

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## ABSTRACT

An experiment was conducted to investigate the expired bread meal used as corn substitution in the broiler diets to optimally the product performance. One hundred day old chick (DOC) male broilers were given the same diet until 2 weeks old, and then given the treatment diet until 7 weeks of age. A Completely Randomized Design was used in this study. Data were analyzed by variance of analysis, and followed by Duncan's Multiple Range Test. The treatments were : T0 = control feed (without expired bread meal), T1 = corn substituted with 10% expired bread meal, T2 = corn substituted with 20% expired bread meal, T3 = corn substituted with 30% expired bread meal and T4 = corn substituted with 40% expired bread meal. The result indicated that corn substituted with expired bread meal up to 40% has not significantly affected on carcass weight, carcass percentage and feed conversion, but decreased significantly on feed consumption and body weight gain. It can be concluded that the use of expired bread meal 30% of the proportion of corn produced the most optimal broiler performance. The substitution corn with expired bread meal 40% was decreased body weight gain.

*Keywords: carcass, corn, expired bread, feed consumption, weight gain*

## INTRODUCTION

Broiler chickens are the most potential source of animal protein because of the rapidity of their growth. Broiler usually is reared for about 4 to 7 weeks. Almost all of feed stuff for poultry are still imported, such as corn, fish meal, poultry meat meal and extracted soybean. NRC (1994) recommended that proportion of corn for poultry feed was about 70%. In most poultry diets, corn will be the major contributor of metabolizable energy (Leeson and Summers, 2005). The energy was very important for maintenance, growth and production. The most metabolism process needed energy from the feed (Labier and Leclercq, 1994).

Indonesian feed meal has still imported corn to fulfill the requirement, therefore using corn in poultry ration will increase the price. In addition, corn was also used as fuel (methanol); therefore the use of corn will compete with foreign exchange resources. Such conditions, it would be a threaten to the poultry industry facilities, especially feed meal production.

Expired bread is waste product of selling bread that is not marketable and not for human

consumption. Bread is produced by large companies as well as home industry. In large companies (bakery), expired bread is processed into dried product bread, but at home industry, expired bread is useless and not profitable product. Generally, bread consisted of wheat flour, eggs, sugar, margarine, cooking oil, and some materials used as the contents of bread are green bean, coconut, chicken meat, beef meat etc. Wheat flour is a source of energy for poultry. Eggs, beans and meat contain high protein and rich in essential amino acids.

Bread and its waste products contain various vitamins and minerals (NRC, 1994). However, the expired bread has bad flavour/taste, damage nutrients, containing fungi and toxins (poisons). Poultry is very sensitive to mycotoxin. There are several species of fungi that produce toxin, such as *Aspergillus sp*, *mycotoxins*, *Penicilium sp* and *Fusarium sp*. (Lesson and Summers, 2005). Mycotoxins lead high mortality (Ensminger, 1980 and Afzal and Zahid, 2004). Chowdhury and Smith (2004) state that mycotoxins contamination decreased feed consumption in the first 4 weeks of laying hens. Feed consumption increased,

however, from 4 to 12 weeks. Swammy *et al.* (2004) reported that mycotoxins affected significantly the decreasing of broiler weight gain from 21 to 42 weeks of age. According to Afzal and Zahid (2004), the levels tolerance of mycotoxin in poultry feed is about 28 ppb that is not affect health and performance of boilers. Giambrone *et al.* (1985) cited by Watts *et al.* (2003) stated that the maximal level of Aflatoxin in poultry feed was 0.2 mg / kg. The use of mycotoxin detoxification enhance antibody which improves body weight and decreases feed conversion significantly. The toxicity level of aflatoxin in feed was 1,2 ppm (Leeson and Summers, 2005).

The nutrition ingredient of expired bread meal was: crude protein 12.63%; crude fibre 0.13%; fat 4.63%; ash 4.19% and BETN 78.42%. While corn contained crude protein 7.4%; crude fibre 4.1% and fat 4.1%. The estimation of energy metabolic of expired bread is 3587 kcal / kg and those of corn is 3350 kcal / kg. Based on the similarity of nutrient content in the expired bread meal and corn, therefore the research was done to investigate the use of expired bread meal to substitute corn in broiler feed in order to obtain optimum broiler performance. This is considering that the expired bread contains mycotoxin that is sensitive to poultry.

## MATERIALS AND METHODS

The study used 100 male day old chick (DOC) broiler, strains Ross 308 and trademarked as 707 CP, with the average body weight of  $37 \pm 0.21$  g. Twenty plots litter cages and the equipments were used for the maintenance of these chicks. Five day old chicks were used in each experimental unit. The treatments were the substitution of corn with expired bread meal those were: 0% (T0), 10% (T1), 20% (T2), 30% (T3) and 40% (T4). The composition of the diet and nutritional content of diet can be seen in Table 1.

The study was started by making the expired bread meal and rearing the day old chick for 2 weeks. The expired bread meal was made by drying the expired bread for 3 days, and then grinded. At this time, the chicks were given feed containing 23% protein and 2900 kcal/ kg. The treatments were applied when chickens were 2 to 7 weeks of age. A Completely Randomized Design was used in this study, with 5 treatments and each treatment was repeat 4 times. The variables measured were feed consumption, body

weight gain, carcass weight, carcass percentage and feed conversion. Data were analyzed by analysis of variance, and followed by Duncan's Multiple Range Test (Steel and Torrie, 1995).

## RESULTS AND DISCUSSION

The effect of treatments on all variables can be seen in the Table 2. The substitution of corn by expired bread meal significantly effected ( $P < 0.05$ ) on feed consumption and weight gain, but it did not significantly affect on carcass weight, carcass percentage and feed conversion. The substitution of corn with 30% expired bread meal did not have significant effect on feed consumption and weight gain, but those substitution at 40% decreased significantly ( $P < 0.05$ ) on feed consumption and weight gain.

### Feed Consumption

As shown in Table 2, it indicated that the substitution of corn with 40% expired bread meal had significantly effect on the feed consumption ( $P < 0.05$ ). Feed consumption of T4 was significantly lower than those of T0, T1, T2 and T3. Feed consumption was affected by energy contain of the feed ( Richards and Proszkowiec-Weglarz, 2007) and crude fibre (North and Bell, 1990) The energy and crude fibre contain of the feeds were almost same. The low feed consumption of T4 was probably because of the excess proportion of expired bread meal that caused different flavour. Expired bread meal might be grown by fungi. Mycotoxins were produced by fungi (Santurio, 2000). According to Hattab (1977) cited by Syamsu (2002), storage can cause changes in smell and taste or flavour. Sarastani *et al.* (2002) reported that long of storage may cause several decreasing of nutrition quality, safety, flavour (taste) and texture, even the smell and taste (Tjandrawati, 2003). The results of the study in accordance with the opinion of North and Bell (1990) that the taste/flavour influences the feed consumption of poultry. The lowest feed consumption of T4 was also caused by mycotoxin. Swammy *et al.* (2004) found that mycotoxin had a negative effect on feed consumption. Mycotoxin was toxic substance produced by fungi. The research of Watts *et al.* (2003) and Chowdhury and Smith (2004) showed, that mycotoxins in diet decreased feed consumption and body weight gain significantly but feed conversion was not significantly different. Similarly to the research of Swammy *et*

Table 1. Feedstuffs Composition and the Nutrient Content of the Experimental Diet.

	T0	T1	T2	T3	T4
Feed Composition:					
Expired bread meal (%)	0.00	4.80	9.60	14.40	19.20
Corn (%)	48.00	43.20	38.40	33.60	28.80
Rice bran (%)	13.90	13.90	13.90	13.90	13.90
Coconut extract (%)	14.00	14.00	14.00	14.00	14.00
Soybean extract (%)	16.00	16.00	16.00	16.00	16.00
Fish meal (%)	8.00	8.00	8.00	8.00	8.00
Top Mix (%)	10.00	0.10	0.10	0.10	0.10
Totally	100.00	100.00	100.00	100.00	100.00
Nutrient content:					
Protein (%)	16.34	16.59	16.85	17.09	17.35
Fat (%)	7.18	7.21	7.23	7.25	7.28
Crude fibre (%)	7.73	7.54	7.35	7.16	6.97
EM (kcal / kg )	3028.82	3039.24	3.049.65	3060.07	3070.48

Table 2. The Effect of Treatments on Broiler Performance

Variables	T0	T1	T2	T3	T4
Feed consumption (g)	1806.32 <sup>a</sup>	1815.43 <sup>a</sup>	1807.17 <sup>a</sup>	1786.47 <sup>a</sup>	1756.00 <sup>b</sup>
Body weight gain (g)	1194.75 <sup>a</sup>	1207.00 <sup>a</sup>	1183.75 <sup>a</sup>	1167.50 <sup>a</sup>	1117.50 <sup>b</sup>
Carcass weights (g)	748.62 <sup>a</sup>	787.00 <sup>a</sup>	735.75 <sup>a</sup>	738.12 <sup>a</sup>	704.62 <sup>a</sup>
Carcass percentage (%)	60.68 <sup>a</sup>	63.79 <sup>a</sup>	61.59 <sup>a</sup>	63.41 <sup>a</sup>	62.77 <sup>a</sup>
Feed conversion	1.52 <sup>a</sup>	1.50 <sup>a</sup>	1.5 <sup>a</sup>	1.53 <sup>a</sup>	1.57 <sup>a</sup>

Different superscript in the same raw indicate statistically differences ( $P < 0.05$ ).

*al.* (2004) that reported that broiler weight gain decreased from 21 to 42 days of age when given diet containing mycotoxin.

Feed consumption of T0, T1, T2 and T3 were not significantly different, these were caused by the low proportion of expired bread meal. The content of mycotoxin was estimated still bellow the toxic level. The tolerant levels of mycotoxin in the poultry feed was 28 ppb (Afzal and Zahid, 2004) or 0.2 mg / kg (Giambrone *et al.*, 1985 cited by Watts *et al.*, 2003).

### Body Weight Gain

The more the feed consumption, the higher the body weight gains. The results of this research in accordance with the opinion of Emman and Charles (1989), that feed consumption has an effect in body weight gain. The substitution of corn with 40% expired bread meal (T4) significantly decreased weight gain. The decrease of weight gain was caused by a taste

or flavour and mycotoxin from expired bread meal. Expired feed or feedstuff may cause the growth of fungi that produced mycotoxin. Therefore, the used of expired bread meal will higher mycotoxin content in the feed. According to Ensminger (1980), a high mycotoxin in feed can inhibit animal growth. Watts *et al.* (2003) reported that mycotoxin in the feed decreased the weight gain of broiler (from 1 to 21 days). The high levels of mycotoxin in feed resulted in the decreasing of serum albumin, total protein, and globulin and blood calcium. The research of Swammy *et al.* (2004) showed that the increase of mycotoxin also reduced the body weight of chicken broilers age from 21 to 42 days. Girish *et al.* (2008) reported that a diet containing mycotoxin decreased turkey's weight gain during grower and developer phases. Mycotoxin can be produced during storage of feedstuff.

The body weight gain of T0, T1, T2 and T3 was not significantly different, it may be caused

by mycotoxin content in T0 - T3 was still in the normal range that did not interfere the growth process. The tolerant mycotoxin levels in poultry feed is 28 ppb (Afzal and Zahid, 2004). In addition, the feed consumption of T1 - T3 was also not significantly different, therefore, the body weight gain was also not significantly different.

### Carcass

Carcass weights and carcass percentages were not significantly different ( $P>0.05$ ) in all treatments of corn substituted by expired bread meal 0% - 40% (T0 - T4); although the T4 had the lowest feed consumption and body weight gain. These results were due to the bread was made of several materials such as wheat flour, eggs, sugar, margarine, cooking oil and some materials used as the contents of green beans, coconut, chicken meat and beef meat. All of these components are source of protein and amino acids (NRC, 1994). The more used of expired bread meal to substitute corn should gave a better quality of diet. Therefore, although the feed consumption of T4 was the lowest, produced the same carcass weight and carcass percentage. Feed ingredients derived from nuts (*leguminosae*) has completely amino acid, especially essential amino acid. Amino acid from nut (*leguminosae*) almost equal to animal protein.

Wahyu (1977) stated that animal proteins have more completely amino acid than plant protein. Protein consumptions were relatively the same in each treatment. The function of protein is primarily to build muscle/meat. A carcass is a part of chicken that contains muscle/meat. The proportion of expired bread meal in T4 was higher than those in T0, T1, T2 and T3, therefore, it may contain more complete amino acid, so although the feed consumption and body weight gain decreased, the weight and percentage of carcass were not significantly different. The research of Quentin *et al.* (2005) concluded that amino acids affected the production of carcass.

### Feed Conversion

The substitution of corn with expired bread meal 0 - 40% had not affected feed conversion ratio. In the treatments of T1-T3, the feed consumption and the weight gain were not significantly different, therefore, the feed conversion were relatively the same. In the treatment of T4, the content of expired bread meal was the highest. Therefore, it might contain the highest mycotoxin that caused reducing feed

consumption and body weight gain as Swamy *et al.*, (2002) and Watts *et al.*, (2003) and reported that the addition of mycotoxin on diet reduced feed consumption and body weight gain simultaneously. As a result, the feed conversion was not significantly different. The experiment of Chowdhury *et al.*, (2005) showed that the mycotoxins level 0.8 – 17.7 µg/g diet not significantly effect on feed efficiency of duck.

### CONCLUSION

The conclusion of the research is the substitution corn with expired bread meal up to 30% in diet produced the most optimal performance compared to 40%. The substitution corn with expired bread meal 40% was decreased body weight gain.

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