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# The Effect of Expired Milk Substitution in Feed on Nutrient Digestibility and Growth of Native Chickens

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## ABSTRACT

*This study used 200 native chickens. The experimental design used was a completely randomized design (CRD), with initial body weight of chicken 89 g ± 2.11g. The experiment used 5 treatment groups and 4 replications, each experimental unit used 10 native chickens. The treatments in this experiment were feed without substitution of expired milk (A); feed with 5% substituted expired milk (B); feed with 10% expired milk (C); feed with 15% expired milk supplementation (D); feed with 20% expired milk substitution (E). The study found that substituted expired milk in feed had no effect on feed digestibility. Expired milk substitution to the level of 10% in the feed did not affect the performance of native chickens (P>0.05) but the substitution of 15% and 20% decreased (P<0.05) performance. It can be concluded that expired milk can be used in native chicken rations to the level of 10% without reducing growth of native chicken.*

**KEYWORDS:** digestibility, growth native chicken, substitution of expired milk

## INTRODUCTION

Fish meal and soybean meal are often used as a source of protein in animal feed, there is a problem because they are expensive and their use is competitive with other animals so they are often difficult to obtain. According to SNI (1996) good quality fish meal contains between 50-60% crude protein and is rich in essential amino acids, especially lysine and methionine. Irianto (2011) stated expired milk is milk that is no longer used or consumed by humans. It is also the remnants of powdered milk attached to the production process equipment or it can also be milk that has expired so that the nutritional levels are not much different from expired milk.

Cheap feed prices can be obtained by utilizing agro-industrial waste (expired milk) which is rich in nutrients so that it is hoped that the productivity of native chickens will not decrease with cheaper feed prices. In the Indonesian market the price of expired milk is 60% of the price of fish meal. Nuriyasa *et al*. (2018) found that the use of agro-industrial waste in animal feed resulted in a financial analysis that gave higher profits to farmers. Research by Puger *et al*. (2019) found that replacing 50 percent of fish meal with gold snail flour had no effect on weight gain and feed conversion for male Bali ducks.

Expired milk is one of the ingredients for native chicken that has not been explored for its potential. Based on the results of the proximate analysis of the Udayana, Indonesia Laboratory 2023, expired milk contains 3023.12 kcal/kg metabolized energy, 13.57% protein, 1.83% calcium, 0.13% phosphorus, 18.63% crude fat and 6.29% crude fiber. The components of expired milk are macronutrients and micronutrients. Alim *et al*.( 2012) stated macronutrients include protein, fat and lactose. The average macronutrient content of rejected milk per 100 g is 25.8% protein, 0.9% fat, 4.6% lactose. The levels of micronutrients in rejected milk are very complete, such as vitamins, minerals and amino acids. The vitamins contained in milk fat are vitamins A, D, E, K, while the vitamins that are soluble in milk are vitamin B complex, vitamin C, vitamin A and vitamin D. The most important soluble vitamins in milk are vitamin B1, B2, nicotinic acid, and pantothenic acid (vitamin B5). Minerals contained in milk are calcium, magnesium, phosphorus Substitution of expired milk in native chicken feed is expected to have no effect on productivity and reduce blood serum cholesterol content.

## RESEARCH METHODOLOGY

### Animal, Experimental design, and management

A total of 200 male native chicken and weighed individually. Chicken were vaccinated according to the standard veterinary practices. The chicken were randomly distributed into 5 treatment groups (4 replicates with 10 chicken per replicate) using a completely randomized design. The treatments consisted of: A (basal diet without expired milk substitution). B (substitution of expired milk 5%), C (substitution of expired milk 10%), and D (substitution of expired milk 15%), E (substitution of 20% expired milk).

### Feed Formulation

The feed was prepared from the following ingredients: yellow corn, coconut meal, fish flour, tapioca flour, expired milk, rice bran, coconut oil, NaCl, and mineral mix. The feed is made with the same energy content (2500 kcal/kg) and protein (14%), according to the SNI (2013) standard, as shown in Table 1.

Table 1 Composition of Feed Ingredients and Nutrient Content of Experimental Feed

| Composition (%) | Treatment | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| Yellow Corn | 45 | 40 | 40 | 35 | 35 |
| Coconut Meal | 18 | 18 | 16.4 | 20 | 19 |
| Fish flour | 10 | 8.25 | 7.5 | 6.5 | 6 |
| Tapioca flour | 4 | 6 | 6.3 | 4.2 | 4.2 |
| Rice Bran | 21.25 | 21 | 18 | 17.5 | 14 |
| Coconut oil | 1 | 1 | 1 | 1 | 1 |
| Expired milk | 0 | 5 | 10 | 15 | 20 |
| NaCl | 0.25 | 0.25 | 0.3 | 0.3 | 0.3 |
| Mineral Mix | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| Total | 100 | 100 | 100 | 100 | 100 |
| **Feed Nutrient Content** | | | | | |
| Energy Metabolism (Kcal/kg) | 2500.07 | 2504,.71 | 2504.08 | 2503.85 | 2503.16 |
| Crude protein (%) | 14.02 | 14.01 | 13.99 | 14.04 | 14.03 |
| Calcium (%) | 0.69 | 0.73 | 0.88 | 0.86 | 0.83 |

| | | | | | |
|---|---|---|---|---|---|
| Phosphorus (%) | 0.53 | 0.51 | 0.48 | 0.42 | 0.41 |
| Fat (%) | 5.27 | 5.67 | 6.63 | 7.49 | 8.23 |
| Crude Fiber (%) | 4.40 | 4.70 | 5.77 | 5.31 | 5.76 |

**Experimental Variables**

**Feed Digestibility**

Nutrient digestibility was calculated by the total collection method, for 1 week. The excreta were collected and dried in the sun to air dry, then dried in an oven at a temperature of (100 - 105$^0$C) for five hours until the excreta were dry. The energy content of excreta can be determined with a bomb calorimeter and protein excretion can be determined by Kjelldhal analysis. All treatment feeds were analyzed proximately to determine the energy and protein content. Dietary dry matter digestibility and nutrient digestibility were calculated by the formula:

$$KC = \frac{(A - B)}{A} \, x \, 100\%$$

Information :
KC: nutrient digestibility (%)
A : nutrient consumption (g)
B : nutrients in feces (g)

**Chicken Growth**

Initial body weight is the weight of the animal before receiving treatment and the final weight is obtained from weighing the animal's weight at 8 weeks old. Weight gain was obtained by subtracting the final body weight from the weight at the beginning of the experiment. Feed consumption is calculated once a week, namely calculating the difference between the amounts of feed provided and the rest of the feed. Feed Conversion Ratio (FCR) is the ratio between the amounts of feed consumed and weight gain, in the same period of time.

**RESULTS AND DISCUSSION**

The results showed that the dry matter digestibility of feed in animals that received feed treatment without substitution of expired milk (A) was 75.51%, treatment of expired milk substitution was 5% (B), substitution of expired milk 10% (C), substitution of expired milk 15% (D) and 20% expired milk substitution (E) caused the dry matter digestibility to be 0.44%, 0.61%, 0.75%, and 0.77% lower but statistically not significantly different ( P>0.05). The efficiency of converting GE to DE in animals that received treatment A was 85.77%, treatments B, C, D and E were 0.51%, 0.83%, 1.04% and 1.22% lower, respectively ( P>0.05) compared to treatment A. Treatment A caused digestibility of crude protein 72.16%, treatments B, C, D and E caused digestibility of crude protein 0.15%, 0.28%, 1.73% and 1, 77% compared to treatment A but not significantly different (P>0.05).

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Table 2 Nutrient Digestibility in Native Chickens fed with expired Milk Substitution with Different Levels

| Variabel | Treatment | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| Dry Matter Digestibility (%) | 75.51±0.74$^{a}$ | 75.18±0.72$^{a}$ | 75.05±.50$^{a}$ | 74.98±1.01$^{a}$ | 74.93±0.40$^{a}$ |
| Efficiency of Converting GE to DE (%) | 85.77±1.06$^{a}$ | 85.33±0.84$^{a}$ | 85.05±0.27$^{a}$ | 84.88±0.12$^{a}$ | 84.72±0.51$^{a}$ |
| Crude Protein Digestibility (%) | 72.16±0.41$^{a}$ | 72.05±0.16$^{a}$ | 71.96±1.88$^{a}$ | 70.91±0.26$^{a}$ | 70.88±0.87$^{a}$ |

Information: a.b (standard deviation) = similar letter notes means there is no significant difference at the Duncan test level has a value of 5% Bagiarta *et al*. (2017) stated that feed digestibility was influenced by crude fiber content. The higher the fiber, the lower the nutrient digestibility. All treatment feed contained crude fiber which was not much different, so it had no significant effect on feed digestibility. The results of the Puger and Nuriyasa research (2019) using fermented wine waste in ducks got the same results.

Table 3 Grwth of native chickens fed with expired milk substitution at Level Different

| Variable | Treatment | | | | |
|---|---|---|---|---|---|
| | A | B | C | D | E |
| Initial Weight (g) | 82.9±0.19$^{a}$ | 83.97±0.40$^{a}$ | 82.98±0.13$^{a}$ | 84.01±0.13$^{a}$ | 85.24±0.49$^{a}$ |
| Final Weight (g) | 1064.18±24.2$^{d}$ | 1058.84±25.9$^{cd}$ | 1028.25±28.4$^{c}$ | 984.53±8$^{b}$ | 950.45±8.9$^{a}$ |
| Weight Gain (g/bird/day | 17.54±0.43$^{d}$ | 17.41±0.45$^{cd}$ | 17.18±0.50$^{c}$ | 16.07±0.12$^{b}$ | 15.44±0.11$^{a}$ |
| Consumption (g/bird/day) | 49.94±0.30$^{d}$ | 46.35±0.34$^{c}$ | 44.08±0.40$^{b}$ | 41.12±0.49$^{a}$ | 41.01±0.27$^{a}$ |
| Feed Conversion Ratio | 2.68±0.7$^{a}$ | 2.67±0.8$^{a}$ | 2.57±0.8$^{a}$ | 2.56±0.04$^{a}$ | 2.66±0.03$^{a}$ |

Information: a.b (standard deviation) = similar letter notes means there is no significant difference at the Duncan test level has a value of 5%

The body weight of native chickens at the beginning of the study ranged from 82.98g to 85.24g which statistically showed no significant difference (P>0.05). This indicates that the weight of the chickens at the beginning of the study was homogeneous. The body weight of native chickens at the end of the study (age 10 weeks) was highest in A treatment, which was 1064.18g. The body weight of chickens at the end of the study that received treatments B and C were 0.51% and 3.38% lower, respectively, but statistically not significantly different

(P>0.05) compared to treatment A. Treatments D and E were 7 ,84% and 10.68% lower (P<0.05) than treatment A. Fish meal is a palatable protein source for poultry and has a high content of essential amino acids, especially lysine, cystine, methionine, and thriptophan (NRC, 1994). Research results McDonald *et al.* (1995) found that fish meal has high minerals (100-200 grams/kg) such as calcium, manganese, iron, iodine, phosphorus, and contains lots of B vitamins, especially choline, B-12, and riboflavin.

The highest weight gain of native chickens occurred in treatment A, namely 17.54 g/day, treatments B and C were 0.74% and 2.05% lower (P>0.05), while treatments D and E were lower respectively. 8.38% and 11.98% (P<0.05) compared to treatment A. The same initial and final weights of treatment B and C compared to treatment A caused the increase in body weight of chickens that received treatment B and C was not different from treatment A. The final weight of chickens treated D and E was significantly different compared to treatment A caused an increase in weight of chickens in treatments D and E were also significantly different, according to the research results of Nuriyasa *et al.*, (2021).

Feed treatment with 20% expired milk substitution (E) caused the lowest feed consumption, namely 41.01 g/bird/day. Treatment D was 0.26% higher (P>0.05) treatment E, while treatment C, B and A were respectively higher (P<0.05) 7.49%, 13.02% and 14.46 % compared to treatment E. Feed with expired milk substitution makes it less tasty for native chickens. This condition causes the substitution rate of expired milk to be higher, feed consumption is getting lower, in accordance with the research results of Nuriyasa *et al*. (2018).

Feed conversion was not affected by substitution treatment for expired milk on native chickens. Undifferentiated conversions indicate that growth differences are due to differences in feed consumption, not differences in feed efficiency, according to the results of Puger *et al*. (2019).

## CONCLUSION

From the results of the study, it can be concluded that supplementation of expired milk in native chicken feed has no effect on feed digestibility, substitution of 15% and 20% causes a decrease growth of native chickens.

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## AUTHORS CONTRIBUTION

I Made Nuriyasa, I Putu Ari Astawa compiled the research idea, I Gusti Lanang Oka Cakra performed the analysis of native chicken blood serum, I Made Nuriyasa was responsible for statistic analysis, all author contributed equally to writing of the final manuscript.

## Conflict of Interest

The authors state that they have no conflict of interest

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