

# Potential of Ration Based on Local Raw Materials as A Substitute of Commercial Ration for Crude Protein, Crude Fat, and Crude Fiber

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**ABSTRACT:** This study aims to determine the potential of rations based on local raw materials as a substitute for commercial rations for crude protein, crude fat, and fiber content. This study uses local feed ingredients in Tanah Laut Regency, South Kalimantan Province: local corn, rice bran, palm kernel cake, fish meal, maggot, stone flour, topmix, and commercial rations with the brand AL 100-II Comfeed produced by PT. Japfa Comfeed Indonesia Tbk. This research method is an experimental method using a completely randomized design (CRD), with five ration treatments and four replications. The treatment rations were A (100% Commercial / Control Ration), B (75% Commercial Ration + 25% Local Ration), C (50% Commercial Ration + 50% Local Ration), D (25 % Commercial Ration + 75% Local Ration) and E (100% Local Basal Ration). The parameters measured were crude protein (%), crude fat (%), and crude fiber (%). The results showed that the nutritional quality of local and factory rations at specific compositions had no significant effect ( $P>0.05$ ) on crude protein, crude fat, and fiber content. This study concluded that the composition of the mixture of local and commercial rations did not affect the nutritional content, especially crude protein, crude fat, and crude fiber. Crude protein content ranges from 16.87% to 17.96%, crude fat from 5.17% to 6.29%, and crude fiber from 5.17% to 6.29%.

**Keywords:** local ration, commercial ration

Reference to this paper should be made as:

Fajri, F., F. Maulana, A. A. B. Persada, D. Sandri, B. P. Febrina, W. M. Lestari, A. L. R. Hutabarat, and M. Zein. 2022. Potential of Ration Based on Local Raw Materials as A Substitute of Commercial Ration for Crude Protein, Crude Fat, and Crude Fiber. *Agritropica: Journal of Agricultural Science*. 5(2): 109-115. Doi: <https://doi.org/10.31186/J.agritropica.5.2.109-115>.

## INTRODUCTION

South Kalimantan, especially Tanah Laut Regency, is an area that has the potential to produce local feed raw materials. However, the level of knowledge of farmers about the type and number of local resources that can be used as poultry feed is still lacking. In addition, how to mix and formulate feed ingredients into ready-to-use rations is also unknown to farmers. In the development of poultry, the problem that farmers commonly experience is the problem of feed. In South Kalimantan, poultry farmers generally use commercial feed. This situation causes farmers' income to be highly dependent on

fluctuations in the price of commercial feed, which tends to rise and rarely experiences a decline in prices. Therefore, efforts are needed to reduce feed costs, which are expected to increase farmer profits and assist in developing poultry-rearing businesses in South Kalimantan, one of which is using local raw materials. Tanah Laut Regency has a corn plantation area of around 10,404 hectares, and the productivity level of corn has increased to an average of 3.97 tons/ha; the development of corn in Tanah Laut Regency is supported by the potential for dry land, which is wide enough

around 471,139 ha (Kabin, 2021). In addition to corn, waste that can be used in preparing poultry rations is from palm oil processing in the form of palm kernel cake (BIS) because Tanah Laut Regency is an area with the potential to produce palm oil. Palm oil production in Tanah Laut Regency in 2018 reached 163 167.00 tons/year (BPS, 2019). Fish production from marine waters in Tanah Laut Regency in 2015 reached 43,367.00 tons/year (BPS, 2016). The largest rice productivity, based on BPS data (2018), the first was occupied by Hulu Sungai Tengah Regency, with a productivity yield of 52.30 quintals/Ha; the second was occupied by Tanah Bumbu Regency, with a productivity yield of 49.19 quintals/Ha and followed by Tabalong Regency which yields productivity is 45.52 quintal/Ha.

From the results of rice milling, 65% of rice yields and 35% of milling waste consisting of husks and bran are obtained, which then become bran. Because of the large number of raw materials are easy to get. In addition to corn, palm kernel cake, fish meal, bran, and soybean meal, maggot (Black Soldier Fly Larvae) can also be used. Maggot is one of the alternative feed sources of animal protein that can help farmers reduce the price of rations. The nutritional content of maggot is CP 40.01%, CF 11.45%, EE 22.63%, Ca

1.07%, P 0.61%, and ME 3714 kcal/kg (Hanifah et al., 2019). The potential and nutritional content of feed raw materials in Tanah Laut Regency, such as corn, palm kernel cake, fish meal, rice bran, soybean meal, and maggot, can be used as feed ingredients to make rations for poultry. So that by utilizing existing local feed raw materials, it can reduce production costs to increase farmer profits and assist in developing poultry farming businesses in South Kalimantan.

## MATERIALS AND METHODS

### Research Material

This study used local feed ingredients in Tanah Laut Regency, South Kalimantan Province: local corn, rice bran, palm kernel cake, fish meal, maggot, stone flour, and topmix, while the manufacturer's ration with the brand AL 100-II Comfeed which produced by PT. Japfa Comfeed Indonesia Tbk. The equipment used in this research is an analytical balance, oven, furnace, and a set of equipment for proximate analysis. The content of feed ingredients and food substances can be seen in table 1. The nutritional content of local and manufacturer rations can be seen in table 2.

Table 1. Content of feed ingredients and nutrients

Ingredients (%)	CP	ME Kkal/kg	CF	EE	Ca	P	Met	Lys	Source
Corn	8.58	3340	2.91	3.80	0.06	0.01	0.20	0.20	Purnama (2020)
Rice Bran	10.60	1900	10.84	4.09	0.70	1.50	0.29	0.51	Purnama (2020)
Maggot	40.01	3714	11.45	22.63	1.07	0.61	0.90	2.20	Kurnia (2021)
Palm kernel	17.31	1670	27.62	7.14	0.27	0.94	0	0	Mirnowati (2018)
Stone Flour	0	0	0	0	38.00	0.17	0	0	Khalil, 2007
Topmix	0	0	0	0	0.06	1.14	0.30	0.30	Medion, 2006
Fish meal	60.00	2750	1.00	2.00	6.50	3.50	1.82	5.28	Leeson and summer 2001

**Table 2.** Nutrient content of local and manufacturer rations

Content	Commercial Ration (%)	Content	Local Ration (%)
Crude Protein	17	Crude Protein	17.00
Crude fat	3	Crude fat	5.37
Crude fiber	Maks 8	Crude fiber	6.64
Calcium	3.8-4.2	Calcium	3.56
Phosphor	0.5	Phosphor	0.38

## Research Methods

This research was conducted using an experimental method. The experimental design used was a completely randomized design (CRD) with five treatments with four replications. Differences between treatments were tested by Duncan's Multiple Range Test (DMRT). The mathematical model of the design used according to Steel and Torie (1995) is:

$$Y_{ij} = \mu + i + j$$

Information:

$Y_{ij}$  = observation value in treatment I, repetition j

j = general mean

i = effect of treatment (1, 2, 3, 4, and 5)

ij = test (1, 2, 3, and 4)

## Variation of Treatment Consists of;

A. 100% Commercial Ration

B. 25% Commercial Ration + 75% Local Ration

C. 50% Commercial Ration + 50% Local Ration

D. 75% Commercial Ration + 25% Local Ration

E. 100% Local Ration

## Observed Parameters

1. Crude protein content (%) (AOAC, 1990)

2. Crude fat (%) (Maulana, 2021)

3. Crude fiber (%) (AOAC, 1990)

## RESULTS AND DISCUSSION

Crude protein, crude fat, and crude fiber are essential nutrients in preparing poultry rations. The average content of crude protein (%), crude fat (%), and crude fiber (%) of the research ration can be seen in Table 3.

**Table 3.** Crude protein content, crude fat, and fiber from a mixture of local and commercial rations.

Treatment	Crude Protein <sup>ns</sup>	Crude Fat <sup>ns</sup>	Crude Fiber <sup>ns</sup>
A. 100% Commercial Ration	16.87	5.17	5.54
B. 25% Commercial Ration + 75% Local Ration	16.89	6.00	5.58
C. 50% Commercial Ration + 50% Local Ration	17.08	5.68	6.05
D. 75% Commercial Ration + 25% Local Ration	17.16	6.29	6.10
E. 100% Local Ration	17.29	6.28	6.34
<b>Standard Error</b>	<b>0.76</b>	<b>0.40</b>	<b>0.45</b>

Informations = different effect is not significant ( $P > 0.05$ )

## Effect of Treatment on Crude Protein Content

The crude protein content of the local and commercial rations ranged from 16.87% to 17.29%. The analysis of variance showed

that the mixture of local and commercial rations with a specific composition had a non-significantly different effect ( $P > 0.05$ ) on the crude protein content. The same crude protein between treatment A (100% Commercial Ration) compared to treatment B

(25% Commercial Ration + 75% Local Ration), treatment C (50% Commercial Ration + 50% Local Ration), treatment D (75% Commercial Ration + 25% Local Ration) and E treatment (100% Local Ration) because the protein is composed of isoproteins in each treatment, this aims to see the quality of local feed ingredients mixed with commercial feed have the same nutritional quality as 100% commercial rations so that it is expected will have the same effect on livestock performance. Rizal (2006), in poultry research, rations must be prepared iso protein so that the result given by livestock is truly from the effect of the treatment we offer. Added by Akhadiarto (2017), different protein content in the ration will affect the performance of different poultry. Proteins are organic compounds composed of amino acids containing elements of C, H, O, and N, sometimes containing elements of S and P. The main function of proteins is to form new tissues and maintain existing tissues because proteins are the basic building blocks of all tissues. body formed (Anggordi, 1995).

The crude protein content of local and commercial rations showed no significant effect ( $P>0.05$ ); this indicated that the protein quality was the same between local feed derived from maggot flour (BSF) and fish meal, while commercial rations were derived from soybean meal and meat bone meal. The use of maggot flour as a poultry feed ingredient has an advantage because maggot has a high protein content of 50.12% (Amran, 2021). Essential amino acids such as lysine, methionine, and glutamate are also contained in maggot flour, where the content of lysine is 2.33%, methionine 0.63, and glutamate 4.31% (Amran, 2021). According to Maulana (2021), livestock uses methionine acid for egg formation, so its content in the ration will affect egg production. Glutamic acid is a non-essential amino acid as a flavor enhancer to increase consumption (Adriani et al. 2014). According to Muliani (2006), glutamic acid

gives a delicious taste to feed, so chickens are encouraged to consume more feed, increasing ration consumption and weight growth. According to Kawai et al. (2002), the administration of glutamic acid can increase the taste of meat. The crude protein content in this study was between 16.87% to 17.29%, where the preparation of the protein ration was for laying hens. According to Angga (2020), the need for ISA Brown laying hens aged 28-60 weeks is 16.25%.

### **Effect of Treatment on Crude Fat**

The crude fat content of the mixture of local and commercial rations ranged from 5.17% to 6.29%. The analysis of variance showed that the mixture of local and commercial rations with a certain composition had a non-significantly different effect ( $P>0.05$ ) on crude fat content. The same crude fat between treatment A (100% Commercial Ration) compared to treatment B (25% Commercial Ration + 75% Local Ration), treatment C (50% Commercial Ration + 50% Local Ration), treatment D (75% Commercial Ration + 25% Local Ration) and E treatment (100% Local Ration) because the fat of the ration in this study was under the requirement of ration fat, namely 5-6%, because fat is one of the energy contributors for livestock for basic life, production, and reproduction. Excess crude fat content in the diet cannot be digested by poultry due to the limited lipase enzyme produced in the small intestine. According to Rizal (2006), the fat content in the ration must be considered, which is between 5-10%, because the high fat in the ration is not by the lipase enzyme produced, which is generally limited. Fat in the ration is a source of energy, avoids dusty rations, and helps absorb food substances such as vitamins A, D, E, and K.

Crude fat content in this study ranged from 5.17% to 6.29%. Crude fat content in commercial rations comes from adding palm olein (palm oil), while crude fat in local rations comes from BSF maggot flour feed

ingredients. According to Amran (2021), flour contains crude fat of about 23.73%. Added by Rido (2021), crude fat in maggot contains omega three fatty acids that are beneficial for humans. According to Susilawati (1994), fatty acids with omega-3 configurations are fatty acids that have the first double bond position on the carbon atom number 3 from the end of the methyl group. Natural fatty acids included in the omega-3 fatty acid group are linolenic acid, eicosapentaenoic acid, and docosahexaenoic acid. According to Diana (2012), essential fatty acids cannot be formed in the body and must be supplied directly from food. Pandiangan et al. (2019) added that omega-3 fatty acids consist of several types of fatty acids, including unsaturated fatty acids, linolenic acid (C:18-3), eicosatrienoic acid (C:20-3), eicosapentaenoic acid/EPA (C:20)-5), decosahexaenoic acid/DHA (C:22-6). The benefits of omega-3 fatty acids for the body are that they can prevent coronary disease, help prevent narrowing and hardening of the arteries (atherosclerosis) and clotting of blood platelets (thrombosis), omega-3 deficiency can increase abnormalities that may not be reversed, especially in infants. (Rasyid, 2003). Crude fat content in this treatment ration ranged from 5.17% to 6.29%. According to Lutfi et al. (2020), Phase II laying hens at 52 weeks require crude fat ranging from 2.5 - 7% in rations.

### **Effect of Treatment on Crude Fiber Content**

The crude fiber content of the local and commercial rations mixture ranged from 5.54% to 6.34%. The analysis of variance showed that a combination of local and commercial rations with a certain composition had a non-significantly different effect ( $P>0.05$ ) on the crude fiber content. The crude fiber in this study's ration ranged from 5.54% to 6.34% because poultry could not digest crude fiber. The inability of poultry to digest crude fiber is because cellulase

enzymes are not produced in higher animals such as poultry; cellulase enzymes are only found in lower animals such as microbes. Therefore, it is necessary to pay attention to the crude fiber content in poultry rations because it can interfere with the performance of the poultry. According to Rizal (2006), crude fiber is a structural carbohydrate consisting of cellulose, hemicellulose, and lignin. Higher animals, such as poultry, do not produce cellulase enzymes; only certain microbes produce this. Maulana (2021) added that crude fiber is needed in small amounts, which is bulky and facilitates stool.

The crude fiber in local rations came from feed ingredients maggot flour, oil palm cake, and rice bran, 11.45%, 10.84% , and 27.62%, respectively. The usually high crude fiber in feeds of vegetable origin, such as oil palm cake because of its shell and rice bran because of the lignin in the husks, which may also be ground. The high crude fiber in maggot flour is due to the high chitin content in the maggot skin, so if the crude fiber analysis is analyzed, the results will be increased. According to Kurniasih and Dwias (2007), chitin is a biopolymer with the most incredible abundance after cellulose. Chitin is structurally the same as cellulose, except it is an amino polysaccharide with an acetamide group at carbon number 2. The presence of this amino group gives chitin unique characteristics, such as a particular biological function, and allows modification reactions to occur. Chitin is estimated to have more potency than cellulose. The crude fiber content in this treatment ration ranged from 5.54% to 6.34%. According to Ansnawi et al. (2017), the limit of crude fiber for laying hens is 5-6%; high crude fiber in the ration can cause a decrease in poultry performance, so it must be considered its presence in the ration.

### **CONCLUSION**

Based on the results of this study, it can be concluded that the composition of the

mixture of local rations and factory rations does not affect the nutritional content, especially crude protein, crude fat, and crude fiber. Crude protein content ranges from 16.87% to 17.26%, crude fat from 5.17% to 6.29%, and crude fiber from 5.17% to 6.29%.

## SUGGESTION

This research suggests trying local and manufacturer rations with certain compositions for livestock, especially broilers, quail, and ducks.

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