Effectiveness of using local ingredients ration to increase KUB chicken productivity in the grower period

A Prasetyo, A Prabowo, P Sudrajad and R N Hayati
Assessment Institute for Agricultural Technology of Central Java
Jl. Soekarno-Hatta KM.26 No.10 Bergas, Semarang, Central Java 50552

E-mail: amsetyo242@gmail.com

Abstract. This study aims to determine the effect of feeding local ingredients to 315 Kampung Unggul Balitbangtan (KUB) chickens, to determine whether this method can increase feed efficiency and productivity. The study used an experimental method using a randomized block design (RBD) consisting of 3 treatments and 7 replications (breeders). Each breeder was assigned 45 chickens, which were maintained until the age of 10 weeks. The treatments tested were P1 = specific feed of breeder (breeder pattern); P2 = feed containing bran (23%), corn (10%), fish meal (11.5%), oil palm cake (24%), BR-1 concentrate (30%), moringa leaf powder (1%) and mineral mix (0.5%); P3 = feed containing bran (25%) and BR-1 concentrate (75%). The observed parameters were feed consumption, final weight, feed conversion ratio (FCR), feed efficiency and Income Over Feed Cost (IOFC). Statistical analysis was carried out on the results using an ANOVA test. When a significant difference was found, it was followed up by a TTukey test with a significant degree α = 0.05, which aimed to find out the difference in the mean between the treatment groups. The results showed that there was a significant difference in the weight gain of KUB chickens overtime during the 10 week study period. This was significantly affected (P<0.05) by feed treatment. The Feed Conversion Ratio was also significantly affected (P<0.05) by the feed treatment. Furthermore, there was significance in IOFC between feed treatments, P3 IOFC ( IDR 31,261), P2 ( IDR 27,068) and P1 ( IDR 25,877). Lastly, there was no significance in FCR between treatments of P1 and P2, whereas there was significance between P3 when compared to P1 and P2.

1. Introduction
Purebred chickens have a greater ability to satisfy demand in the community than native chickens, a fact which is proven by the significantly higher price of native chickens. This also explains why there is a low population of free-range chickens, as people find it difficult to supply this type of chicken meat on the market. On the other hand, there is therefore a large opportunity to increase the prospects and market development of native chickens in the future. Furthermore, the maintenance of native chickens in Indonesia is carried out using three production systems, namely (1) traditional; (2) semi-intensive and (3) intensive. In general, maintenance of native chickens in rural areas is still traditional, with total ownership of no more than 30 units/breeder. Therefore, this system has very low productivity.

Increasing the productivity of native chickens can be accomplished by using three approaches, namely (1) improvement of genetic quality, (2) improvement of feed and (3) better management techniques. Improving the genetic quality of native chickens requires specific technologies and often
involves long periods and high costs. Therefore, it can only be carried out by government agencies. Feed improvement can be carried out by the optimization of local ingredients that are used in the feed application. This has the potential to increase the feed efficiency of native chickens, therefore increasing productivity. Better management techniques can be achieved by intensifying the maintenance system used to farm chickens and by adopting better disease control methods.

The feed is a major requirement for the growth and production of livestock, especially in the case of broiler poultry. The use of local ingredients to increase the nutritional value of green plants as feed sources can be a solution to both the shortage of feed ingredients and the problems that arise from feed waste.

One example of a plant that can be a nutritious feed source is *Moringa oleifera*. The composition of this plant’s leaves includes a high crude protein content (27.44%), crude fiber (9.13%), crude fat (6.3%), ash (11.42%), calcium (1.4%), phosphorus (0.35%) and 2978 ME kcal/kg of energy [1]. An additional benefit of Moringa leaves is that they also contain many bioactive compounds that are beneficial for animal health.

Therefore this research aims to determine the effect of feeding local ingredients to Kampung Unggul Balitbangtan (KUB) chickens, with a focus on whether this technique can improve feed efficiency and chicken productivity.

2. Method

The study was carried out in Bendan village, Banyudono district, Boyolali regency, Central Java, between January and May 2020. Furthermore, proximate feed analysis was carried out at the Central Java AIAT Laboratory.

This study used 3 feed treatments and 4 weeks old KUB chickens. A total of 15 KUB chickens were used for each treatment with 7 replications. The composition of feed for treatment 2 and treatment 3 was presented in table 1.

| Composition            | Feed 2 (%) | Feed 3 (%) |
|------------------------|------------|------------|
| Brand                  | 23         | 25         |
| Ground corn            | 10         |            |
| Fish meal              | 11.5       |            |
| Palm cake              | 24         |            |
| Concentrate (BR-1)     | 30         | 75         |
| Moringa powder         | 1          |            |
| Mineral mix            | 0.5        |            |
|                        | 100        | 100        |

| Nutrient content *)|          |            |
|-------------------|----------|------------|
| Crude protein     | 13.9     | 176        |
| Crude fiber       | 9.5      | 5.3        |
| Crude fat         | 5.2      | 5.1        |
| Ash               | 6.7      | 8.7        |
| Energy (Kcal/Kg)  | 2,700    | 2,800      |
| Calcium           | 0.4      | 1.1        |
| Phosphorus        | 0.8      | 0.9        |

*) Analysis Results from Central Java AIAT Laboratory, May 2020.
### 2.1. Method

Feed treatment was started on KUB chickens at the age of 4 weeks. P1 treatment (breeder pattern), each breeder provides a special feed. P2 treatment and P3 treatment used the composition of the AIAT which feeds based on the age of the chickens and the weight of each individual. KUB chickens are reared until the age of 10 weeks and their growth is measured by weighing every 1 week until the chickens are 4 weeks old, then continued with weighing every 2 weeks. The composition of feed 1 presented in table 2.

#### Table 2. Feed 1 composition 1 (commercial feed)

| Breeder | Composition | (%) | Price IDR/Kg | Price (IDR/Kg) |
|---------|-------------|-----|--------------|----------------|
| Warjinem | Corn        | 25  | 6,000        | 5,750          |
|         | Bran        | 25  | 4,000        |
|         | BR-1        |     |              |
|         | Concentrate | 25  | 8,000        |
|         | Groat rice  | 25  | 5,000        |
|         | Protein     |     | 12.75        |
| Daliyem /Turut | Concentrate  | 25  | 8,000        | 7,250          |
|         | Quail Feed (Benefit) | 75  | 7,000        |
|         | Protein     |     | 19.25        |
| Aliyem   | BR-1        |     |              |
|         | Concentrate | 50  | 8,000        | 5,250          |
|         | Bran        | 50  | 2,500        |
|         | Protein     |     | 15.00        |
| Agus     | BR-1        |     |              |
|         | Concentrate | 60  | 8,000        | 6,460          |
|         | Bran        | 20  | 3,800        |
|         | Aking rice  | 20  | 4,500        |
|         | Protein     |     | 15.4         |
| Siti     | BR-1        |     |              |
|         | Concentrate | 66.7| 3,800        | 6,600          |
|         | Bran        | 33.3| 8,000        |
|         | Protein     |     | 16.67        |
| Kaliyem  | BR-1        |     |              |
|         | Concentrate | 50  | 8,000        | 7,000          |
|         | Corn        | 50  | 6,000        |
|         | Protein     |     | 14           |
| Prapti W | BR-1        |     |              |
|         | Concentrate | 100 | 8,000        | 8,000          |
|         | Protein     |     | 20           |

### 2.2. Data analysis

The results of the study were analyzed statistically using an ANOVA test. Where a significant difference was found, it was followed by a Tukey test with a significant degree $\alpha = 0.05$, which aimed to find the difference in the mean between the treatment groups.

Observed parameters in growth performance were feed consumption, weight gain, FCR, feed
efficiency and IOFC. The feed conversion ratio was measured by calculating the ratio of weight gain to feed consumption. Feed efficiency was measured by calculating the ratio of PBBH to feed consumption $X 100%$. IOFC was calculated using the equation IDR = (A x B) - (C x D)

IOFC calculation information: A = final body weight; B = selling price of chickens per kg; C = total feed consumption and D = price of treatment feed per kg.

3. Result and discussion

The KUB chickens fed with treatment P3 produced an average of the lowest feed conversion ratio of 3.11. This shows a significant average conversion ratio when compared to treatments P1 and P2. The feed conversion ratio of treatment P1 was 3.62 and for treatment P2 it was 3.57, resulting in an insignificant average KUB chicken feed conversion ratio. This means that it took 3.11 kg of feed P3 to get 1 kg of KUB chicken meat. In comparison, for feed P2 it took 3.62 kg of feed to get 1 kg of KUB chicken meat and for feed P1 it took 3.57 kg.

In terms of feed composition, the price had a large effect on feed efficiency. In this study, the composition of P2 had a price of IDR 5,715/kg and the composition of P3 had a price of IDR 6,875/kg. The treatment of P1 had different price ranges for each farmer due to the different ingredients, however, it had a mean of IDR 6,615.71/kg. The highest feed efficiency was found in treatment P3, with a feed efficiency of 29.19%. Feed efficiency of P2 was 25.69%, and for P1 it was 25.07%. The high value of feed efficiency for P3 feed indicates that this treatment yields increasingly efficient meat formation.

The final weights of KUB chickens from treatments P1, P2, and P3 respectively were 11 kg, 11.73 kg and 13.56 kg. The feed consumption of KUB chickens treated from 4 weeks old until 10 weeks old was 50.5 g/bird/day for P1; 54.50 g/bird/day for P2 and 55.83 g/bird/day for P3. The feed consumption of KUB chickens at 10 weeks old ranges between 50-70 g/bird/day [2]. Analysis of the IOFC showed that KUB chicken sales for treatment P1 were IDR 25,877/head. The treatment P2 the IOFC was IDR 27,068/bird and for P3 it was IDR 31,261/bird (table 3). This is on the assumption that the price of a living KUB chicken in June 2020 was IDR 35,000/kg. In comparison, research showed that the IOFC of a native chicken was IDR 10,194 - 15,209 [3].

The variation in IOFC was caused by the price of P1 feed, along with the fact that the final weight of KUB chickens differed for each breeder at the location of the study. The highest P1 feed sales were obtained by Mrs Daliyem/Mr. Turut with IDR 479,679 - a feed price of IDR 7,250/kg. The second-highest sales were obtained by Mrs Kaliyem with IDR 470,067 with feed prices of IDR 7,000 kg, Mrs Prapti obtained sales of IDR 406,245 with feed prices of IDR 8,000/kg. Mrs Aliyem obtained sales of IDR 302,824 - with feed prices of IDR 5,250/kg. Mr Agus obtained sales of IDR 29,7881 - with feed prices of IDR 6,460/kg. Mrs Siti Mulyani obtained sales of IDR 288,915, with feed prices of IDR 6,600/kg. The lowest sales were obtained by Mrs Warjinem with sales of IDR 238,363 – with feed prices of IDR 5,750/kg.

It was found that the higher the protein content of the feed, the higher the cost and final weight of KUB chickens. Meanwhile, the powder of leaves from plants with high protein content such as Indigofera can be used to reduce the feed cost. America is currently focusing on research into protein production, using an Alfalfa leaf cantillate concentrate called PRO-XAN as poultry feed [4]. The soluble protein content is predominantly made up of Ribulose 1,5-bisphosphate carboxylase/oxygenase, which makes up more than 50%, and a small percentage of insoluble protein is found in the leaf cell walls [5].

Research using broiler chickens aged 5 weeks old with the addition of Moringa leaf powder at levels of 2 - 6% showed that this did not significantly affect feed consumption or feed digestibility [6]. Whereas research using laying hens kept for up to 42 weeks with the addition of Moringa leaf powder at levels of 0.5 - 2% showed that the addition of 2% Moringa leaves gave the best effect on egg productivity and quality [7]. Additionally, research results on 60 female and 12 male KUB chickens fed by local ingredients with the addition of 5% Moringa leaves and 1% turmeric powder showed there was a significant influence on egg production and feed conversion [8].
Table 3. The treatment parameter and IOFC value of KUB chickens

| Variable | Treatment | P1       | P2       | P3       | P-value |
|----------|-----------|----------|----------|----------|---------|
| FE (%)   |           | 25.07±1.75 | 25.69±2.38 | 29.19±1.47 | P<0.01  |
| IOFC (IDR/head) | 25,877±1,475.45 | 27,068±971.58 | 31,261±1,009.17 | P<0.01  |
| FI (g/bird/day) | 50.50±2.04 | 54.50±2.50 | 55.83±3.03 | P>0.01  |
| DG (g/bird/day) | 12.7±1.1  | 14.06±0.1  | 16.3±0.7  | P<0.01  |
| FCR      |           | 3.57±0.12  | 3.62±0.23  | 3.11±0.14  | P<0.01  |

Note: FE = feed efficiency; IOFC = Income Over Feed Cost, P1 = breeder feed, P2 = 23% rice bran, 10% corn, 11.5% fish meal, 24% palm oil cake, 30% Br-1 concentrate, 1% Moringa leaf powder and top mix 0.5%; P3 = bran 25% and 75% concentrate. FI = feed intake, DG = Daily Gain, FCR = feed conversion ratio.

4. Conclusion
The treatment 25% bran and 75% BR-1 concentrate (P3) increased the productivity of KUB chickens and was more effective and the highest sales results and feed efficiency.

References
[1] Olugbemi TS, Mutayoba S K and Lekule F P 2010 Effect of moringa (Moringa oleifera) inclusion in cassava based diets fed to broiler chickens *Int. J. Poult. Sci.* 9 363-7
[2] Iskandar S 2018 *Petunjuk Teknis Produksi Ayam Lokal Pedaging Unggul (Program Pembibitan Tahun 2017)* (Jakarta: Kementerian Pertanian)
[3] Anggraini A D, Widodo W, Rahayu I D and Sutanto A 2019 Efektivitas penambahan tepung temulawak dalam ransum sebagai upaya peningkatan produktivitas ayam kampung super *Jurnal Sains Peternakan Indonesia* 14 222–7
[4] Maria S F and Mette L 2020 Production of leaf protein concentrates in green biorefineries as alternative feed for monogastric animals *Anim. Feed Sci. Tech.* 268 1-20
[5] Tamayo T, Kyriakopoulou K E, Suarez-Garcia E, van den Berg C and van der Goot A J 2018 Understanding differences in protein fractionation from conventional crops, and herbaceous and aquatic biomass-consequences for industrial use *Trends Food Sci. Technol.* 71 235–45
[6] Natsir S, Rahmawati A and Dian A 2019 Efek pemberian tepung daun kelor terhadap konsumsi dan kecernaan pakan ayam broiler umur 5 minggu *Ind. J. Anim. Agric. Sci.* 1 8-12
[7] Edi W S, Oskin and Sandiifran H D 2016 Effect of moringa (Moringa oleifera) leaf meal supplementation in layer chicken diet on production performance and egg quality *Buletin Peternakan* 40 197-202
[8] Hafiszah and Sarjuni S 2017 Evaluasi Penggunaan Bahan Pakan Lokal terhadap Performa Produksi Telur dan Kinerja Penetasan Ayam Kampung Super Prosiding Seminar Nasional Teknologi Peternakan dan Veteriner 8-9 Agustus 2017 (Jakarta: IAARD Press) 415-21