THE USE OF FERMENTED CATTLE FECES IN THE RATION ON PRODUCTION AND REPRODUCTION PERFORMANCE SABU AND SEMAU NATIVE CHICKENS

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ABSTRACT

This research was conducted to examine the use of fermented cow feces in the ration on the production and reproductive performance of Sabu and Semau native chickens. Each group consisted of 6 males and 18 females aged 1.5-2 years who were used as parents. From *interse* mating, 144 chickens are produced. A completely randomized design of 2x3 factorial pattern was used in this study, so there were 2 factors, firstly feed factor: T0 = basal ration + 0% fermented cattle feces (control); T1 = 90% basal ration + 10% fermented cattle feces; T2 = 80% basal ration + 20% fermented cattle feces. The second factor is the genetic groups, namely: S = Sabu Chicken and M = Semau Chicken. Each treatment was repeated 2 times, and each replication consisted of 1 male and 3 females. The variables studied were egg production, egg weight, fertility, hatchability, DOC weight, body weight 4 and 8 weeks. The results showed that the use of fermented cattle feces in basal rations of up to 20% gave better results for egg production and egg weight. Whereas the other variables have no effect, so it can be concluded that fermented cattle feces can be used in ration of Sabu and Semau native chicken.

Keywords: fermented cattle feces, sabu chicken, semau chicken

INTRODUCTION

Local chicken or better known as native chicken is one of Indonesia's natural resources which until now has played a significant role in supporting the provision of nutrition for the community. Nurtini (2009) states that local chickens are a reliable daily source of income, especially for low-income people in both villages and cities and are flexible exchanges, which can help meet the needs of their owners

The main problem in the effort to develop native chicken is the seeds and feed, in addition to maintenance management that needs special attention. Indeed, various types of native chickens have been found that can be used as germ plasm, but the problem is returning to the adaptability of the various genetic groups are varying for each location. Therefore, the type of native chicken that has been established or well adapted in an area is more likely to be developed in the area rather than introducing chickens from other areas which may not be able to produce well in new areas.

Sabu and Semau chickens are native chickens from Sabu Island and Semau Island, East Nusa Tenggara, which have specific advantages and can be used to increase production and productivity of native chickens because Sabu chickens have been known to have good growth and Semau chickens are allegedly resistant to disease and good maternal abilities. If both types of chickens are crossed, it can be obtained a chicken that can grow fast and disease resistant can be obtained. The superiority of Sabu chicken and Semau chicken can be utilized to increase production and reproduction of native chickens in NTT which according to the data are very low in production and reproductive nature (Lapihu, *et al*., 2019). Telupere and Nalley (2018) found that egg production, egg weight, fertility, hatchability and hatching weight of Sabu chickens with Sabu chickens were as follows: 23.75%, 39.83 grams, 82.48%, 50.49% and 28.44 grams, respectively.

Native chicken can consume ration with low protein content, so commercial feeding can be combined with other feed ingredients that are cheaper and good quality, such as cattle feces. Guntoro, et al. (2013) reported that the use of processed cattle feces beef ducks ration at the 15% level was proven not to cause a decline in growth. Furthermore, the use of up to 20% in beef ducks ration is still more profitable economically than the use of conventional ration. The use of fermented cattle feces up to 15% in native chicken ration does not cause a significant decrease in egg productivity, and does not cause an increase in FCR (Guntoro, et al., 2016)

Research at native chicken with a combined treatment of the use of processed cattle feces with the provision of probiotics (Bio-L) in the ration of laying hens until level of 20% can increase egg production by three to four percent (Sweken, 2015). Savings in feed were around five to seven grams per animal per day. In addition, the price of ration is cheaper by around 12 to 15 percent compared to conventional ration. This research was conducted to examine the effect of the use of fermented cow dung in the ration on the display of production and reproduction of Sabu and Semau chickens.

MATERIALS AND RESEARCH METHODS

This study were used 48 adult chickens as parents consisting of 6 Sabu males and 18 Sabu females and 6 Semau males and 18 Semau females with aged 1.5-2 years. The chickens are placed in individual cages and mated through pure mating (*interse* mating), ie Sabu males are mated to Sabu females and Semau males are mated with Semau females. Mating is carried out using artificial insemination. The eggs produced from the mating are hatched using a hatching machine to see fertility, hatchability and hatch weight (DOC).

The feed given to the parents are BR2 as basal rations and cow feces. Drinking water is given *ad libitum*. Chicks feed consists of BR1 from 0-4 week (starter period), and then is given BR2 plus cattle feces until 8 weeks of age.

The experimental design used was a Completely Randomized Design with 3x2 Factorial Pattern. The first factor is feed, namely: T0: basal ration + 0% fermented cattle feces (control); T1: 90% basal ration + 10% fermented cattle feces; T2: 80% basal bation + 20% fermented cattle feces. The second factor is the genetic group, namely: S: Sabu Chicken and M: Chicken All. Thus there are 6 treatment combinations, namely: S-T0, S-T1, S-T2, M-T0, M-T1, and M-T2. Each treatment was repeated 2 times, and each replication consisted of 1 male and 3 females.

The selection of male and female parents were carried out in the area of origin, namely on Sabu Island and Semau Island, East Nusa Tenggara then followed by *ex-situ* conservation, i.e maintenance outside of their original place (Kupang City). Observation of the production and reproduction character of the parents were egg production, egg weight, fertility, hatchability, DOC weight, and observation of F1 growth of Sabu and Semau native chickens were body weight 0, 4, and 8 weeks. Data obtained were analyzed using analysis of variance (ANOVA). If the results of the analysis of variance indicate a significant effect, a further analysis will be conducted using Duncan's Multiple Range Test. All data analyzes were performed using the SPSS 21 software package.

RESULTS AND DISCUSSION

Egg Production and Weight

The effect of the addition of fermented cow feces in the ration to the average egg production for 21 days of observation and egg weight of Sabu and Semau chickens is presented in Table 1.

Table 1. Effect of the addition of fermented cattle feces in the ration on the average egg production and egg weight of Sabu and Semau chickens

Treatment Combination	Egg Production (egg)	Egg Weight (g)
T0 – S	7,83 ± 3,06	39,33 ± 1,21
T1 – S	7,50 ± 1,87	43,00 ± 3,16
T2 – S	10,83 ± 2,48	44,00 ± 5,18
T0 – M	8,67 ± 1,37	40,83 ± 2,71
T1 – M	10,00 ± 1,67	42,50 ± 2,74
T2 – M	10,00 ± 1,55	43,83 ± 4,54

Egg Production

The data in Table 1 shows that the production of Sabu chicken eggs which consume rations containing fermented cow feces (FCF) 20% (T2-S) is higher than other treatment combinations, while Sabu chicken which consumes rations which contain 10% of FCF was the lowest. Semau chicken seems to be more compatible with the ration given compared to Sabu chicken as it appears that the egg production of Semau chicken tends to be better with increasing FCF content in the ration. The low egg production in the T1-S combination may be due to the Sabu chicken receiving this treatment, its body weight is quite high (> 1500 grams) because the placement of chickens in the treatment is done randomly without regard to the body weight of the female. Telupere (1994) found that there was a negative relationship between egg production and parent body weight, i.e. the heavier a parent, the less egg production, and vice versa.

Genetically it is seem that Semau chickens produce more eggs (9.56 eggs) compared to Sabu chickens (8.72 eggs) in the period of one laying egg period (21 days) although was not significantly different (P> 0.05), statistically. The slight advantage possessed by Semau chickens in egg production can be utilized to increase the production of native chickens if kept intensively for a longer period.

Judging from the feed given, the chicken that consumed feed containing FCF has a higher egg production compared to the one that does not. The results showed that chickens that consumed T2 (rations containing 20% FCF) had better egg production (10.42 eggs) followed by T1 (8.75 eggs) and T0 was the lowest (8.25 eggs). Statistical analysis showed that the feed had a significant effect (P <0.05) on egg production, and further test results showed that T2 was significantly different (P, 0.5) than T0. The results obtained indicate that the addition of FCF in the ration can increase egg production of native chickens.

There is no interaction effect between feed and genetic groups, pointing to differences produced more due to feed consumed than genetic groups or interactions between feed and genetic groups. In addition, it can be concluded that the two genetic groups can produce well if fed with fermented cattle feces.

Egg Weight

Egg weights observed in this study ranged from 38.02 g to 45.98 g. The treatment combination of T2-S produced the highest average egg weight of 44.00 ± 5.18 grams, followed by T2-M and T1-S, and T0-S was the lowest 39.33 ± 1.21 grams. These findings point to rations containing 20% FCF was able to increase egg weight of the chickens studied.

Statistical analysis showed that the interaction did not have a significant effect (P> 0.05) on egg weight, indicating that there was no interaction between feed given and genetic groups on egg weight. Genetically, eggs weight of Semau chickens are slightly heavier than Sabu chickens (42.11 vs 42.39 grams), but no significant difference (P> 0.05) was found, statistically. No significant differences were found in egg weight based on the genetic group of native chickens, pointing to the two genetic groups having a different response to environmental factors imposed on them, in this case feed containing fermented cattle feces.

Feed is one of the environmental factors that has a significant effect (P <0.05) on egg weight, ie chickens that consume 20% FCF containing eggs are significantly heavier than chickens that consume feed without FCF. The results obtained indicate that the addition of FCF in the ration can increase the egg weight of Sabu and Semau chickens.

The results found are in agree with findings from researchers at the Bali Agricultural Technology Research Institute (Guntoro, 2016) which the use of cattle feces up to 20% does not cause a decrease in egg weight. The combination of the use of probiotics (Bio-L) causes an increase in egg weight, on the other hand the use of probiotics tends to reduce feed consumption so that the combined use of rations containing cattle feces up to 20% by administering probiotics causes a decrease in FCR (more efficient).

Fertility and Hatchability

The effect of the addition of fermented cow feces in the ration to the fertility and hatchability of Sabu and Semau chickens is presented in Table 2.

Table 2. Effect of the addition of fermented cattle feces in the ration on the average fertility and hatchability of Sabu and Semau chicken eggs (%)

Treatment Combination	Fertility	Hatchability
T0 – S	80,50 ± 6,22	61,50 ± 7,06
T1 – S	80,00 ± 4,77	66,33 ± 8,04
T2 – S	83,00 ± 7,69	68,00 ± 3,03
T0 – M	77,83 ± 4,17	68,33 ± 3,93
T1 – M	80,50 ± 3,45	69,67 ± 4,59
T2 – M	81,33 ± 7,09	68,33 ± 8,52

Fertility

The results of this study indicate that the highest fertility was found in the combination of T2-S, 83.00 ± 7.69%, followed by T2-M and the lowest was T0-M, 77.83 ± 4.17%. There was no effect of interaction between feed given and genetic groups. Although there is no significant effect either from feed, genetic groups or their interactions, the results obtained indicate that there is a tendency to increase fertility rates in line with increasing FCF levels in the ration. This occurs in both the genetic group Sabu and the Semau chickens.

Egg fertility is obtained after fertilization, which is the fusion of sperm and ovum. The higher the percentage of fertility obtained, the better the probability of hatchability (Sinabutar, 2009). Fertility refers to the ability to produce offspring from the level of fertility of animal where the higher of fertility rate, the more fertile the chicken.

The fertility rate in this study can be categorized quite well because it ranges from 77.83% to 83%. The results found are higher than what was found by Suryani, et al. (2012), namely 74.24%, Nafiu et al. (2014), which is 52.72%, and Rajab (2014), which is 70.92%. But lower than reported by Helendra, *et al*. (2011), namely the fertility of native chicken eggs in the city of Padang is 85%. Hafsah and Sarjuni (2017) also reported the fertility of native chicken eggs that received local feed ingredients ranged from 93.34 - 100%. The difference either lower or higher than the fertility rate found by previous researchers compared with the results of this study may be due to the type of native chicken used, feed provided, and other factors that contribute to fertility including length of storage of hatching eggs, management at the time of hatching and other environmental factors.

Hatchability

Hatchability is the ratio between the number of eggs that hatch and the number of fertilized eggs. The highest hatchability of this study was found in the combination of T1-M treatment, which was 69.67 ± 4.59%, followed by T2-M (68.33 ± 8.52%), T0-M (68.33 ± 3 , 93%, T2-S (68.00 ± 3.03%), T1-S (66.33 ± 8.04%), and the lowest is T0-S (61.50 ± 7.06%). It seems that the hatchability of Semau chicken is higher than Sabu chicken, but the results of statistical analysis showed that neither feed, genetic groups, nor interactions between feed and genetic groups had no significant effect (P> 0.05) on the hatchability of their eggs. There is no significant effect indicated that the differences that occur are likely due to the potential possessed by each animal research.

The results of this study are higher than those reported by Helendra *et al*. (2011) which only obtained hatchability of 49.4% and Nafiu et al. (2014) who used hatching with electric heat source hatching machines (45.61%) but were lower than those found by Herlina, et al. (2016), where hatchability of Merawang chicken eggs ranged from 79.17 to 93.75%. Irianty et al. (2005) reported that the addition of vitamin E by 20 mg/kg of feed in native chickens produced hatchability of 73.31% and 30 mg/kg of feed produced hatchability of 74.11%. Zulkarnain (2010) reported that the average hatchability of native chicken eggs was 71.67%.

Growth

Growth of F1 chicks from mating between Sabu and Semau chickens was measured through DOC weight, body weight at 4 weeks, and body weight at 8 weeks. The results of measurements of these variables are presented in Table 3.

Table 3. Effect of the addition of fermented cattle feces in the ration on the average weight of DOC, body weight 4 weeks and body weight at 8 weeks F1 offspring of Sabu and Semau chickens (g)

Treatment Combination	DOC Weight	4 Weeks Body Weight	8 Weeks Body Weight
T0 – S	28,67 ± 2,07	342,17 ± 17,87	636,67 ± 36,56
T1 – S	27,33 ± 1,86	355,67 ± 11,50	661,67 ± 16,32
T2 – S	28,83 ± 2,40	346,17 ± 14,95	643,33 ± 33,42
T0 – M	27,50 ± 1,64	339,17 ± 14,29	616,33 ± 32,68
T1 – M	28,83 ± 2,40	351,33 ± 10,11	643,83 ± 40,07
T2 – M	29,17 ± 2,32	346,67 ± 18,91	627,50 ± 55,66

DOC weight is the result of weighing chicks immediately after hatching (less than 24 hours). The data in Table 3 showed that the T2-M treatment combination had the highest DOC weight (29.17 ± 2.32 g) followed by T2-S, T1-M, T0-S, T0-M, and the lowest was noted in the treatment combination T1-S (27.33 ± 1.86 g). The difference in the weight of DOC seems to have a relationship with egg weight where large eggs tend to produce high DOC weights as well. The level of FCF in feed given to parents tends to increase the weight of DOC, which is the higher level of FCF in the ration, the higher weight of DOC, especially in Semau chicken. The response of feed containing FCF from Sabu chicken was not very apparent.

The results of the analysis of variance showed that neither feed, genetic groups, nor interactions between feed and genetic groups had no significant effect ($P > 0.05$) on the weight of DOC. The results obtained indicate that the weight of the DOC depends more on the weight of the egg and not on the feed given or the genetic group of the chickens.

The finding of DOC weights in this study was higher than the DOC weights of Tolaki chickens (Herlina, et al., 2016) both hatched using electric heat source hatching machines (26.47 g) and combination heat source hatching machines (26.96 g). Genetically, Sabu and Semau native chickens have the ability to produce better DOC weights than Tolaki native chickens. However, the local chickens raised by Jimmny's Farm (Sadid, 2016) have a higher DOC weight than this study, possibly because the chickens at Jimmny's Farm have undergone a good selection, while the chickens used in present study not going through a selection process. The chickens used in this study were selected based on individual appearance without prior genetic records.

Body weights of 4 weeks ranged from 339.17 ± 14.29 g (T0-M) to 355.67 ± 11.50 g (T1-S). This finding indicated that the DOC weight is not linear with a 4 week age weight. The influence of the feed environment dominates more body weight at 4 weeks where the chickens that consume rations containing 10% FCF have better body weight, both in the Sabu chicken group and the Semau chicken. Both of these genetic groups have a different response to the feed given.

Statistical analysis showed that the treatment group had no significant effect (P> 0.05) on body weight at 4 weeks of age. Similarly, feed and genetic groups had no significant effect on body weight at 4 weeks. The absence of significant influence from the treatment given showed that the differences produced may be due to the individual effect of each animal. According to Eriko, *et al*. (2016), native chickens fed commercial feed can produce body weight at 4 weeks of 331.33 g, while those fed a mixture of commercial feed with rice bran produce lower body weight.

Genetically, the average body weight of Sabu chicken is 348 g, while Semau chicken is 345.72 g. The very small difference between Sabu chicken and Semau chicken is probably caused by the treatment given to the chickens is the same and another thing that can explain this situation is the growth at starter period, not yet influenced by the genetic makeup of each animal.

The body weights of 8 weeks of age in this study ranged from 616.33 ± 32.68 g (T0-M) to 661.67 ± 16.32 g (T1-S). Sabu chicken which consumes feed containing 10% FCF produces 8 weeks body weight higher than other treatments, while Semau chicken that consumes rations without FCF produces the lowest body weight. These findings indicate that native chickens do not need feed with high protein content because the excess protein will be removed through the excreted feces..

The results of the analysis of variance showed that neither feed, genetic groups, or interactions between feed and genetic groups had no significant effect (P> 0.05) on body weight at 8 weeks of age. The lack of effect of treatment on 8 weeks body weight maybe due to the response of the chickens to the treatment given is no different. Chickens that consume high protein feed (T0) are no better than those that consume low protein feed (T2) because for native chicken, the protein content of rations between 14-16% can meet their needs. In addition, genetically, Sabu chickens and Semau chickens are already accustomed to low quality feed, so even though consume feed containing FCF up to 20% does not have a significant effect on their growth which are manifested in body weight that is not significant different.

Some previous studies found that the body weight of 8-week-old native chickens varied greatly, ranging from 482.50 g to 647 g (Bidura and Suasta, 2006). The variation in body weight of native chicken is caused by different types of native chicken, maintenance systems and the feed provided is also different.

CONCLUSIONS

Based on the results obtained in this study, it can be concluded as follows:

1. The use of fermented cattle feces in the basal ration has a significant influence on egg production and egg weight of the Savu and Semau native chickens, where the addition of up to 20% gives better results compared to chickens receiving rations without fermented dung feces.
2. The use of fermented cattle feces in rations has no significant effect on reproductive characteristics such as fertility, hatchability, and hatching weight.
3. The use of fermented cattle feces in rations has no significant effect on the nature of growth in body weight from 0 weeks to 8 weeks.

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