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# The effect of protease enzyme supplementation to productivity eggs of alabio duck

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## Abstract

Efforts to increase egg production in poultry, including ducks this time a lot is done by manipulating the feed, one of which has been developed and has a good prospect is the supplementation of enzymes including protease enzyme in poultry. The purpose of the study was to determine the effect of enzyme supplementation on the productivity of duck eggs Alabio. The method used in this study using completely randomized design with 4 treatments and 5 replications, where each repetition consisted of five ducks, so the number of ducks research is 100 laying ducks. Factors to be tested is a protease enzyme supplementation in the diet of ducks consists of five factors, these factors are E1 = control ration without enzyme supplementation; E2 = 0.10% enzyme supplementation in the ration; E3 = 0.15% enzyme supplementation in the ration; E4 = 0.30% enzyme supplementation in the ration; and E5 = 0.5% of enzyme supplementation in the ration. Variables measured in the study was the rate of egg production (henday production), egg weight, feed conversion, feed intake. The results showed that the best treatment supplementation of enzymes substantially improve and increase the performance of duck egg production Alabio where supplementation of 0.15% protease enzyme in the ration (E3), because it can improve egg production rate to 83.51% henday production, egg weight with the highest achievements of egg weight 64.36 g.egg-1, and the feed conversion ratio (FCR) at 3.01.

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**Introduction**

Alabio laying ducks still allowing increased production of eggs by the manipulation of the ration, one of them by way of the main enzymes protease enzyme. Currently, according to Biyatmoko (2014) ducks Alabio still around 60-70 percent needs to be improved in the range of 80 percent to lead to intensive businesses profitable, otherwise farmers would switch to other breeds or breeds cruciferous more productive.

An enzyme is a protein that has the ability to catalyze reactions in which the substrate is converted to products through the formation of an enzyme complex -substrat as intermediate products, where enzymes are catalysts produced by living organisms. The catalyst can be defined as a substance which can increase the speed of chemical reactions (Anitha *et al.*, 2010). Benefits of adding enzymes in the ration is intended to improve the digestibility of the ration, reducing the anti-nutritional substances in the diet, increasing the availability of certain nutrients (Jia *et al.*, 2008)), improve the efficiency of food as well as many isolated to be used as feed additive (feed additive). Production of hydrolytic enzymes that are developed for monogastric including poultry is a protease, amylase, phitase and mannanase (Adrizal *et al.*, 2011).

Mechanism of action of enzymes in the digestive tract of poultry is the main break down the cell walls of the particles ration, so it will liberate nutrients, making it more digestible by digestive enzymes and increase the availability of nutrients cause the results of the digestion of food becomes more homogeneous in the gastrointestinal tract, and makes the process of absorption (absorption) of nutrients to be better (Adams, 2000). According to Anitha *et al.,* (2009) the addition of enzymes at a rate of 0.06% in the diet is able to improve feed conversion and improvement of egg weight and egg production duck age of 21-56 weeks. Furthermore, said the addition of the enzyme is also able to improve performance fiber diets with higher levels of up to 12% compared with the ration fiber level of 8% without adverse consequences productivity laying ducks. Enzyme supplementation was also able to increase the weight of the egg and yolk as well as on quail eggshell thickness of layer (Ahmed *et al.,* 2012). The positive impact of enzyme supplementation in the di*et al*so reported Jia *et al.* (2008) in which the enzyme supplementation real karhohidrase improve and enhance the absorption of food (feed utilization), egg shell quality (eggshell quality) and egg production in chickens. Supplementation of enzymes able to improve poultry performance because the enzyme can increase dry matter digestibility of feed (Aggoor *et al.*, 2006). The aim of this study was to determine the effect of enzyme supplementation on the productivity of duck eggs Alabio.

**Materials and methods**

*Materials*

The research lasted for 8 weeks Alabio production of duck production was only 28 weeks to 36 weeks, carried out in poultry Animal Production Studies Program Faculty of Agriculture Unlam.

*Materials used in this study are*

1.Using 100 ducks pullet age of 28 weeks, derived from duck farms in rural districts Mamar at HSU city.

2.Raw materials rations consisting of rice bran, yellow corn, fish meal, coconut oil, fish oil, corn oil, Limestone and topmix and protease enzymes. Rations and drinking water for the ducks given adlibitum. Ration composed iso iso calories and protein corresponding phase duck Alabio age with 19% protein content and calories in 2700 kkal.kg-1 according to the recommendations of duck nutrition Alabio (Biyatmoko, 1994). Rations and drinking water for the ducks given adlibitum. Equipment used in the study consisted of 20 cage system Litter (postal) complete with food and drink, every cage is filled as much as 5 mice per cage measuring 75 cm x 50 cm x 60 cm, the scales sitting capacity of 2 kg for weighing the ration , analytical balance for measuring the weight of the eggs and the rest of the feed and egg production recording board treatment.

*Methods*

The experimental design using a *Complete Random Design* 4 treatments with 5 replications, where each repetition consisted of five ducks, so the number of ducks research is 100 ducks pullet.

Factors to be tested is a protease enzyme supplementation in the diet of ducks include:
E1 = control ration without enzyme supplementation
E2 = 0.10% of enzyme supplementation in the diet
E3 = 0.15% of enzyme supplementation in the diet
E4 = 0.30% of enzyme supplementation in the diet
E5 = 0.5% of enzyme supplementation in the diet

Variables measured in the study were egg production rate (Henday production), egg weight, and feed conversion ratio (FCR). Differences between variables were analyzed with ANOVA with post test using Duncan Multiple Range Test (Steel and Torrie, 1994).

**Results and discussion**

The average level of productivity of ducks Alabio include the level of egg production, egg weight, egg consumption and feed conversion ratio (FCR) produced more Alabio ducks presented at Table 1.

**Table 1.** The average level of productivity of laying Alabio ducks.

| Parameters | Levels of Enzyme Suplementation | | | | | Average |
|---|---|---|---|---|---|---|
| | E1 (control) | E2 (0,10%) | E3 (0,15%) | E4 (0,30%) | E5 (0,5%) | |
| a. Hen Day Production (%) | 66.11$^{a}$ | 69.63$^{b}$ | 83.51$^{c}$ | 81.02$^{d}$ | 81.85$^{c}$ | 77.28 |
| b. Egg Weight (g.duck$^{-1}$) | 62.22$^{a}$ | 63.25$^{ab}$ | 64.36$^{b}$ | 64.34$^{b}$ | 64.23$^{b}$ | 63.68 |
| c. Egg Weight (kg.day$^{-1}$) | 0.82 | 0.88 | 1.07 | 1.04 | 1.05 | 0.97 |
| d. Feed Intake (g.duck$^{-1}$) | 156.15 | 157.32 | 161.25 | 160.56 | 158.52 | 158.76 |
| e. Feed Intake (kg.day$^{-1}$) | 3.12 | 3.15 | 3.22 | 3.21 | 3.17 | 3.17 |
| f. Feed Conversion Rratio (FCR = e / c ) | 3.50$^{b}$ | 3.30$^{a}$ | 3.01$^{a}$ | 3.01$^{a}$ | 3.02$^{a}$ | 3.16 |

Different superscript among treatments, different significantly ($p < 0.05$).

Results of analysis of variance showed the interaction of different enzyme supplementation in the ration significant effect ($p < 0.05$) to hen day production, egg weight, feed intake and feed conversion ratio (FCR). These results indicate that the addition of real enzymes improve and enhance the performance of production of duck eggs Alabio during egg production than control (E1). Achievement of the highest egg production generated by 0.15% protease enzyme supplementation in the diet (E3) because it can improve egg production rate to 83.51% and the lowest was 66.11% for control (E1). These results are corroborated by Anitha *et al.,* (2009) that the addition of the enzyme at a rate of 0.06% in the diet can increase the production of duck egg age of 21-56 weeks, while Javer *et al.* (2015) reported the addition of a protease enzyme of 500 g.ton$^{-1}$ in ration will increase the production of laying hens aged 44 weeks, although not increased the thick egg shell. The same results were corroborated by Mathlouthi *et al.* (2010) which states that the improvement trend in the production of chicken eggs Isa Brown, although not real with enzyme supplemented using the 560 and 2800 IU xylanase and β-glucanase.kg-1 is able to increase the weight of 45-week old chickens as much as 86 g while ISA brown chickens were without enzyme supplementation lose weight as much as 103 g at the end of the study. On the other hand, Janice and Derek (2007) states *arabinoxylanase* on feed enzyme combination was also able to lower feed costs and increase margins on the maintenance of white leghorn. Supplementation of enzymes will break down the cell walls of the particles feed, so it will be easier to digest by enzyme digestion, improve nutrient availability is higher by as in vitro capable of lowering the viscosity in the feed (Mathlouthi *et al.* (2010), and led to the results of digestion of food become more homogeneous in the gastrointestinal tract, and makes the process of absorption of food to be better (Adams, 2000). In addition, the use of the

enzyme will reduce the nutrients out with excreta such as protein and minerals, as well as reduce the influence of anti-nutritional food in a bind nutrients include acid amino and phosphorus (Costa *et al.*, 2004).

The weight of the eggs in this study also increased ($p < 0.05$) compared with no enzyme supplementation (control), where supplementation enzin 0.15% The results of the most large egg weight and more efficient with the achievements of egg weight 64.36 g compared to 0.3% and 0.5% and the more economically priced rations. Similar results were also reported Anitha *et al.,* (2009) and Alaelden (2011) that the supplementation of enzymes provide a response to the increased weight of the eggs on wheat-based low-energy feed. The increased weight of the egg through enzyme supplementation caused partly by the improved digestibility of feed protein, dietary fat and fiber feed given, where provision is best achieved in the addition of 2% of enzyme (Esonul *et al.,* 2005). Improvements weights achieved by supplementation of enzymes due to the increased weight of the egg yolk which correlates to a large bobor eggs (Ahmed *et al.*, 2012), improve and enhance the absorption of food (Jia *et al.,* 2008; Torki, 2014), as well as improve digestibility material dry feed (Aggoor *et al.*, 2006).

Feed conversion ratio (FCR) was also significantly better ($p < 0.05$) in the supplementation of enzymes that E2-E5 treatment ranged from 3.01 to 3.30 in comparison with no enzyme that is E1 (control) at 3.5. FCR is the ratio between the amount of feed consumed (kg.day-1) compared to the weight of the eggs produced (kg.day-1). Treatment with enzyme supplementation of between 0.1 - 0.5% shows the feed intake slightly higher but capable of producing higher egg weight making it more efficient. These results as reported Mathlouthi *et al.* (2010) by administering the enzyme Quatrazyme 20 mg.kg-1 feed can improve FCR in chickens. Meanwhile, according to Javer *et al.* (2015) the addition of 500 g.ton-1 protease enzyme in the feed in addition to increase egg production was also able to improve significantly from 2.11 FCR becomes 1.99 at the end of the study, as was also observed by Novack *et al.* (2008) and Costa *et al.* (2004). Repair FCR is caused by an increase in egg production (Bedford, 2000; Elangovan, 2004) and efficiency digestibility of feed (Gracia 2009; Alaeldein 2011) as well as the absorption of food consumed (Broz J and Ward, 2007; Adubados, 2011).

## Conclusion

The best treatment supplementation of protease enzymes which can increase egg production of Alabio ducks was supplementation of 0.15% protease enzyme in the ration (E3), because it can improve egg production rate to 83.51% henday (HDP), egg weight with the highest achievements of egg weight 64.36 g.egg-1, and the feed conversion ratio (FCR) at 3.01.

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