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# Hatchability and Hatching Weight of Local Broiler Chickens Injected in Ovo Amino Acids Combined with Hydroxyl Methyl Butyrate (HMB)

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**Abstract**

The study was conducted to determine the effect of in ovo injection of several essential amino acids combined with Hydroxyl Methyl Butyrate (HMB) on hatchability and hatching weight of Local Broiler chickens. Four hundred and twenty eggs collected from alope hens of 24 months of age were used in this study. The hens reared intensively and fed with commercial ration. Automatic incubation machine was used and on the seventh day of incubation, the eggs were candled. Infertile eggs removed and fertile eggs were treated. The fertile eggs were injected with combination of amino acids and HMB consisting of HMB 0% + amino acids 0% (control), HMB 0.1% + L-arginine 0.1%, HMB 0.1% + L-tryptophan 0.1%, HMB 0.1% + L-thereonine 0.1%, 0% HMB + L-arginine 0.1%, 0% HMB + L-tryptophan 0.1% and 0% HMB + L-thereonine 0.1%. The combination of HMB and amino acids treatments were dissolved in 0.9% physiological NaCl solution and injected as much as 0.5 ml per egg on the 7th day of incubation. Each treatment unit consisted of 20 eggs and was repeated for three hatching periods. At the hatching time, the number of hatched chicks was recorded, and the chicks were weighed for the hatching weight determination. The results showed that in ovo injection treatments decreased hatchability compared to control. The combination of amino acids and HMB showed higher hatchability compared to treatments of amino acid without HMB and the highest hatchability was obtained at the treatment of HMB 0.1% + L-tryptophan 0.1%. The injection combination of HMB and amino acids has no effect on hatching weight and there was a tendency that addition HMB resulting low hatching weight compared administration amino acids without HMB.

**Keywords:** In ovo injection, amino acids, HMB, power hatch, chicken Local Broiler

**Full-length article** **Corresponding Author*, e-mail: *andiariandi110217@gmail.com* Doi # https://doi.org/10.62877/117-IJCBS-24-25-19-117

## 1. Introduction

Local broiler chicken is a type of village chicken that was developed using the method of collecting village chickens from around Makassar which were selected and given ovo feeding treatment, then the F1 results were developed to be used as brood stock and their cultivation continues to be developed to this day. Local Broiler chicken is one of Indonesia's local chickens. Free-range chickens often found in villages and kept using traditional systems [1]. Reported that free-range chickens are resistant to disease and are more adaptable. Good compared to commercials for purebred chickens. Slow growth with low feed efficiency is the main problem in free-range chickens [2]. Efforts to increase the productivity of Local Broiler chickens that are currently widely researched and implemented are the use of important nutrients to maximize the potential for embryo development in eggs during the incubation period.

Through this method, it hoped that the hatching percentage will be high and chickens can hatch with better performance and condition and can be maintained in the post-hatching period or even in the next generation without changing their genetics [3]. States that one of the most important physiological processes in the prenatal phase is maintaining glucose balance by utilizing muscle protein into glucose so that it can inhibit the growth and development of the embryo [4]. Reported that the in ovo method has a long-term impact in supporting increased body weight and muscle after the incubation period. In Ovo Feeding is the provision of exogenous nutrition to eggs during the incubation period. In Ovo Feeding has been reported to improve chicken performance after hatching (5; 14; 2). This condition believed to occur due to optimal embryo development during the organogenesis process, due to the increased availability of nutritional status for the embryo.

Hydroxyl methyl butyrate is metabolites from leucine, which has a role important in muscle protein metabolism. In ovo feeding on the 7th day of incubation increased hatchability by 4.34% compared to controls (89.67% compared to 85.33) and showed higher body weight, weight gain and percentage of chest muscle. HMB significantly increased plasma growth hormone insulin. From research reported by [5] β -hydroxy- β -methylbutyrate (HMB), a leucine metabolite, reduced chicken mortality and increased carcass yield. L-Arginine is an amino acid that classified as semi-essential [6-7]. Reported that giving L-Arginine in the embryonic phase can increase the effectiveness of using turkey feed after hatching [3]. Suggested that L-Arginine is an important stimulator of growth hormone release. L-tryptophan functions as a serotonin trigger, stimulates niacin production, stimulates the release of growth hormone, reduces blood cholesterol, increases appetite, increases body weight [8]. Tryptophan also contributes to better utilization of other amino acids and of feed in general [9]. L- Threonine (Thar) is amino acids used in existing metabolic process role important like protein synthesis and formation of sour tendon. Threonine is one of the precursors of the formation of mucin (mucus) in the duct's digestion. The mucin will form protective layer surface channel digestion from sour excess and microbe's pathogens, as well filter nutrients incoming feed for absorbed body [10] Influence L-threonine injection does not significant to child's body weight chick.

## 2. Materials and Methods

This research will carried out from July to September 2023, at the Poultry Laboratory, Faculty of Animal Husbandry, Hasanuddin University, and Makassar. In this study, the ingredients used were 420 Local Broiler chicken eggs, amino acids (L-Arginine, L-tryptophan and L-threonine), HMB, NaCl, alcohol, formalin and disinfectants [11-12]. The supporting equipment used is automatic hatching machines, drilling tools, egg binoculars, and analytical scales, measuring cups, spatulas, glass mixers, label paper and cloth. This research conducted experimentally using a Completely Randomized Design (CRD) with seven treatments and three replications with the following structure:

Treatment:

E0A0: Control without treatment

E1A1: HMB 0.1% + L-arginine 0.1% in 0.9% physiological NaCl solution on the 7th day of incubation

E1A2: HMB 0.1% +L- tryptopha 0.1% in 0.9% physiological NaCl solution on the 7th day of incubation

E1A3: HMB 0.1% + L-threonine 0.1% in 0.9% physiological NaCl solution on the 7th day of incubation

E2A1: Non-HMB+ L-arginine 0.1% in 0.9% physiological NaCl solution on the 7th day of incubation

E2A2: Non-HMB + L-tryptophan 0.1% in 0.9% physiological NaCl solution on the 7th day of incubation

E3A3: Non-HMB + L-threonine 0.1% in 0.9% physiological NaCl solution on the 7th day of incubation

### *2.1. Procedure Study*

Procedure stage 1 incubation and injection in ovo feeding a total of 420 eggs egg free-range chickens obtained from the Hasanuddin University animal husbandry lab [13]. Egg cleaned, weighed one by one, fumigated and inserted into a machine-equipped hatch with round automatic. Incubation temperature and humidity were maintained at 37-38 oC and 50-55% humidity, respectively. On the 7th day of incubation, each egg was probed to determine embryo development and for the IOF process [14]. Infertile eggs or eggs containing dead embryos were removed, and the remaining fertile eggs were injected with treatment with 3 repetitions and 20 eggs per repetition. Before injection, selected eggs telescoped to identify the position of the albumen as an injection target. The tip of the inserted needle cleaned with alcohol, after making a hole in it with a drill. A sterile solution of 0.5 mL (0.1% HMB + 0.1% amino acids dissolved in 0.9% NaCl) and without HMB (0.1% amino acids dissolved in 0.9% NaCl) was injected into the albumen. Using a 24 G needle to a depth of 1 cm [15-16]. The injection process carried out under aseptic conditions to avoid contamination. Next, the injection hole closed with hot glue as a cover. The injected eggs put back into the hatching machine, and the incubation process continues until they hatch on the 21st day. At hatching, the number of hatchlings and hatching weight will measured.

## 3. Results and discussion

The results of the analysis of variance in Table 1 show that providing additional nutrition to eggs had no significant effect ($P<0.05$) on hatching weight but had a significant effect ($P>0.05$) on hatchability between the E1A2 treatment and the other five treatments except the control.

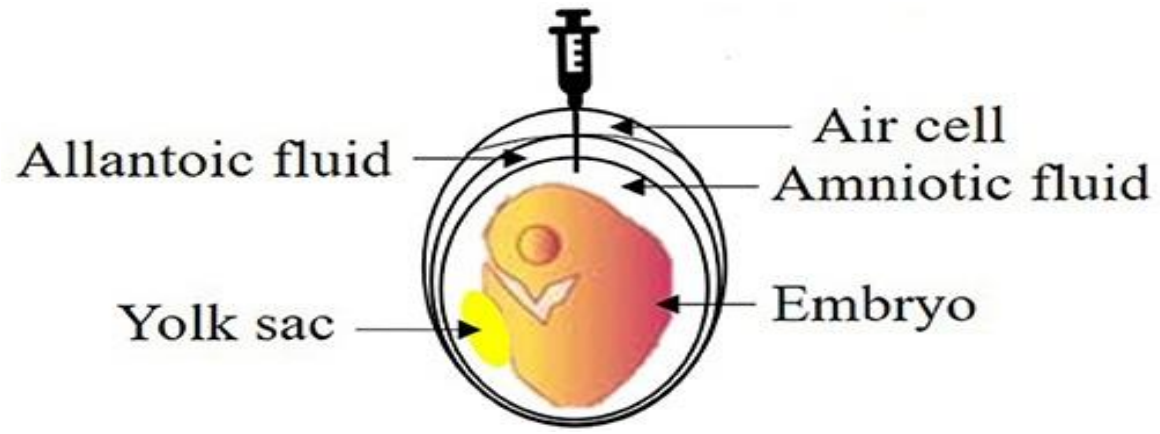


**Figure 1.** Nutrient injection process

**Table 1.** Average Hatchability and Hatching Weight of Local Broiler Chickens Injected with Several Amino Acids and Combinations with Hydroxyl Methyl Butyrate (HMB)

| Parameter | In Ovo Feeding | | | | | | |
|---|---|---|---|---|---|---|---|
| | Control | E1A1 | E1A2 | E1A3 | E2A1 | E2A2 | E2A3 |
| **Hatchability (%)** | 73.33 ± 2.88 [c] | 65 ± 8.66 [BC] | 73.33 ± 5.77 [c] | 48.33 ± 17.55 [ab] | 51.66 ± 2.88 [ab] | 58 11.66 ± 7.63 [bc] | 38.33 ± 14.43 [a] |
| **Weight hatch (g)** | 33.10 ± 2.28 [a] | 34.00 ± 1.25 [a] | 30.00 ± 1.78 [a] | 33.00 ± 2.59 [a] | 31.00 ± 2.78 [a] | 32.50 ± 4.30 [a] | 34.20 ± 1.38 [a] |

## 4. Conclusions

This study aims to test the effect of amino acid injection and its combination with HMB through injection into fertile chicken eggs. It has found that: The combination of amino acids and HMB showed higher hatchability compared to the amino acid treatment without HMB and the highest hatchability obtained in the 0.1% HMB + 0.1% L-tryptophan treatment. The combination of amino acids and HMB had no effect on hatching weight.

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