

Effect of Dietary Amino Acids on the Production of Broilers

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Abstract

The aim of the experiments was to compare the feed formulation based either on the total or digestible amino acid contents of broiler diets. The ROSS 308 hybrid broilers were divided into two groups – a control group and a test group. Average weight at the age of 35 days, feed consumption, cost of feed per 1 kg of live weight and slaughter efficiency were monitored as evaluation criteria. Results of trials have confirmed that the calculation of dietary nutrients in digestible values represents an improvement in the performance as well as in the economic parameters of fattening.

Introduction

The requirement for amino acids is traditionally studied in balance trials in which graded levels of amino acids are fed to animals. The concentration of amino acids at which maximum growth is achieved is usually considered the value of the requirement. These determinations are carried out over a relatively long period (usually from 20 to 40 days of age). As the response of individual parameters of performance to various levels of amino acids varies, it is necessary to know – when determining the requirement for amino acids – which parameter is to be maximized or optimized. Differences in amino acids requirements ensuring the maximum response of individual parameters are documented by Leclercq(1998).

Materials and Methods

We carried out several two-group trials in an experimental broiler hall with the aim to compare the efficacy of two dietary formulations which differed only in their expression of amino acids values. The testing was conducted using ROSS 308 broilers fattened for a period of 35 days and the following diets were fed: BR1 – 1 to 14 days, BR2 – 15 to 28 days and BR3 to 29 – 35 days (Tables No. 1 and 2). The composition of diets tested (components and nutrients) is presented in Tables No 1. and 2. Values of digestible amino acids of individual components proceed from tabulation values (source: Degussa and Rhone Poulenc, resp. Adisseo tables). The two diets, i.e. the control and the experimental one, are iso-energetic and have the same content of Ca, P, Na and other nutrients. The broilers were housed in air-conditioned halls on deep bedding (17 broilers per m²) with 23 hours of lighting. Average weight at the age of 35 days, feed consumption, cost of feed per 1 kg of live weight and slaughter efficiency were monitored as evaluation criteria.

Table 1. Control diet calculated in the total amino acid content

Nutrients	BR1	BR2	BR3
ME (MJ/kg)	12.6	13.1	13.3
CP (g/kg)	230	210	195
Lysine (g/kg)	13.6	13	11
Methionine (g/kg)	5.4	5	4.6
Methionine+ Cystine (g/kg)	9.6	9.2	8.2
Threonine (g/kg)	8.5	8.3	7.2
Arginine (g/kg)	15.3	14.7	12.7
Tryptophan (g/kg)	2.4	2.2	1.9

Table 2. Experimental diet calculated in digestible amino acid content

Nutrients	BR1	BR2	BR3
ME (MJ/kg)	12.6	13.1	13.3
CP (g/kg)	225	208	190
Lysine (g/kg)	11.6	10.9	9.2
Methionine (g/kg)	4.7	4.4	4
Met.+Cystine (g/kg)	8.4	8.1	7.2
Threonine (g/kg)	7.3	7.1	6.2
Arginine (g/kg)	12.9	12.3	10.6
Tryptophan (g/kg)	2.1	1.9	1.7

Results and Discussion

Table 3. Trial No. 1

Test groups	Number of chickens	Mortality	Average weight at the age of 35 days (g)	Feed consumption per 1 kg of l.w. (g)	EEF	Cost of feed per 1 kg of l.w.
Control	476	4.8	1741.5 a	1863.8	254	0.4 EUR
Experiment	485	3	1833.2 b	1733.7	293	0.348 EUR

Table 4. Trial No. 2

Test groups	Number of chickens	Mortality	Average weight at the age of 35 days (g)	Feed consumption per 1 kg of l.w. (g)	EEF	Cost of feed per 1 kg of l.w.
Control	241	3.6	1751 a	1751.3	275.4	0.376 EUR
Experiment	245	2	1772.9 a	1563.3	317.5	0.315 EUR

a, b - differences between means in the same column identified with various letters are statistically significant ($P < 0.05$)

$$\text{EEF} = \frac{\% \text{ of surviving birds} \times \text{mean body mass on release}}{\text{number of days of fattening} \times \text{feed consumption in kg per 1 kg of gain}} \times 100$$

Results of trials have confirmed that the calculation of dietary amino acids in digestible values represents an improvement in the performance as well as in the economic parameters of fattening (see Tables 3,4).

Growth of the broilers expressed as the average weight at the age of 35 days was increased in the experimental groups in comparison with the control groups (figure 1). The difference between the experimental and the control group was statistically significant/trial no. 1 / This result has also confirmed that the elimination of animal origin feed components, particularly flesh-and-bone meal, from complete feed diets would have a negative influence on the growth potential of broilers.

Also, the consumption of total feed diets in kg per 1 kg of live weight was lower in the tested groups (see figure 2). It is therefore obvious that easily digestible and balanced amino acids improve the conversion of the feed diet itself. Cost of feed reduced by 13 resp 16 % in the experimental group.

The mortality in the tested groups (Tables 3,4) was decreased . We may state that the excess of proteins and unbalanced energy-nitrogen ratio considerably burdens the broiler's body.

In practice, it is often solved whether the diet formulation for broilers should be carried out according to the total or digestible amino acids. The lowest cost of the feed "in digestible amino acids" requires especially a detailed knowledge of raw materials used, their quality, stability and availability.

Conclusion

The profitability of broiler production depends on the price of the complete feed and other factors; some are shown in the trials carried out. Based on the achieved results we can state that the feed formulation in digestible amino acids with the use of efficient feeding components will lead not only to improved parameters of production efficiency itself but also negate the impacts of harmful substances on the environment and provide maximum profit to the keeper and thus the future outlook of the poultry industry.

References

Leclercq, B. (1998), Poultry Science, 77, pp. 118-123