100 % Organic feed for poultry – results of feed trials in the UK

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Abstract

Current regulations for organic monogastric production systems permit feed ingredients of non-organic origin, primarily due to concerns about meeting the demand for the essential amino acids methionine and lysine. However, 100 % organic diets will become compulsory in the EU from 1st January 2015, so there is a need to develop feeds which will supply the required level of nutrients and support high animal health and welfare. This paper reports on feeding trials carried out with broilers in the UK to investigate the impact of three 100 % organic diets: a control diet with globally sourced ingredients, a diet based on locally sourced (i.e. within Europe) organic ingredients, and a diet based on locally sourced organic ingredients and algae. The results of the summer and winter trials showed that there was no significant difference in bird weights between the three diets, indicating that using locally sourced and locally sourced with algae feeds do not impact on broiler productivity.

Introduction

Current regulations for organic pig and poultry production systems permit feed ingredients of non-organic origin, primarily due to concerns that a 100% organic diet would be unable to meet the demand for the essential amino acids methionine and lysine. This is compounded by the fact that the most obvious and commonly used protein feed source (soya) is not widely grown in Europe due to climatic conditions, and there are environmental and social concerns about using imported soya. However, 100 % organic diets for poultry and pigs are due to become compulsory in the EU from 1st January 2015. This paper reports on feeding trials carried out with broilers in the UK to investigate the impact of locally sourced 100 % organic feed on broiler performance. Our hypothesis is that productivity will be maintained when globally-sourced protein feed resources are replaced by locally sourced organic ingredients.

Material and methods

Two feed trials were carried out at FAI Farm, Oxford, UK, one over the summer (July-Aug 2012) and one over the winter (Jan-Feb 2013). The three 100 % organic diets tested were: a control diet with globally sourced ingredients, a diet based on locally sourced (i.e. within Europe) organic ingredients, and a diet based on locally sourced organic ingredients and algae. Algae are an excellent source of methionine. The algae (*Spirulina*) were grown in North Wales using a production system that creates zero waste, and the slurry produced was freeze-dried and sent to the feed mill for inclusion in a standard pellet. The three diets were developed to provide similar nutritional profiles and are detailed in Table 1 below.

In the summer trial, the broilers (Hubbard JA 757) were housed in two houses positioned side by side. Each house was divided into twelve pens and four pens in each house were fed each of three diets. Each pen contained 10 or 11 birds. Due to the colder weather conditions in the winter it was necessary to double the amount of birds in the house to ensure that the birds were able to keep warm. Thus only one house was used in the winter trial. Twenty birds were placed in each pen and four pens were fed each of the three diets. In both the winter and summer trails, weights were recorded on a weekly basis taking a sample of 50% of the birds from each pen. The mean weight was calculated for each pen and thus the mean weight for each of the trial diets.

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Table 1: Diet ingredients and nutritional information.

	Fresh Weight Percentage		
Raw materials	**Control**	**Local feed**	**Local feed with Algae**
Wheat	56.91	30	30.29
Soya Expeller	22.24	0	0
Sunflower Expeller	9.78	12	6.62
Maize	5	21.37	21.59
Rape Expeller	0	15	15
Sweet Lupins	0	14.29	10
Beans	0	0	5
Algae	0	0	3
Linseed Expeller	0	2.09	3.5
Soya Oil	2.01	2.35	2.5
Di Cal Phosphate	1.45	0.45	0.55
Rice Concentrate	1.15	0	0
Vitamins and Minerals	0.75	0.75	0.75
Calcium Carbonate	0.71	1.2	1.2
Px Lucerne Concentrate	0	0.5	0
Nutritional Information			
Crude Protein	20.15	19.5	19.54
Lysine	0.95	0.85	0.88
Methionine Eq	0.38	0.37	0.4
Methionine	0.33	0.32	0.35
Meth + Cys	0.68	0.7	0.71
Tryptophan	0.23	0.21	0.2
Threonine	0.7	0.74	0.77
Av Lysine	0.85	0.66	0.64
Metabolisable energy (MJ/kg)	12.65	12.2	12.3

The statistical analysis was carried out using R version 2.15.2 (R development core team, 2009). The weights across the diets and the weight gains across the diets were compared using ANOVA (analysis of variance). A two-factor ANOVA was used to analyse the summer feed trial data to test that the house did not have an impact on the weights. Post-hoc testing was unnecessary.

Results

The summer trial data was analysed to see whether there was a significant difference between the diets in terms of total weight gain (i.e. the final weight minus the initial weight). The ANOVA gives $F=1.064$ (on 5 and 18 degrees of freedom) with a p value of 0.4121. There is no significant difference suggesting that neither the house nor the diet have an effect on weight gain. Removing the effect of house and modelling the weight gain with diet as the only factor gives $F=0.03978$ (on 2 and 21 degrees of freedom) with a p value of 0.961.

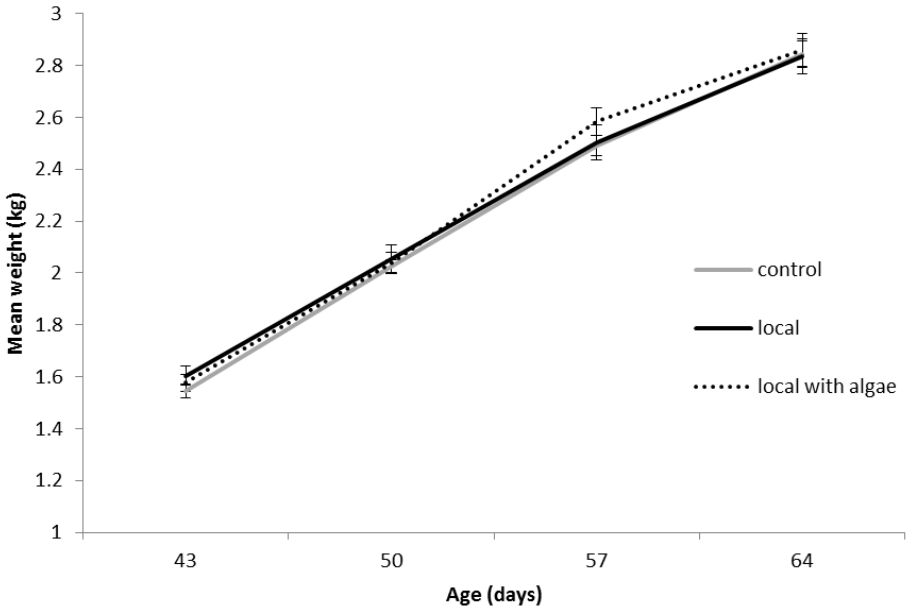

Figure 1: Plot of weight gain for each diet in the summer trial. Error bars shown are standard errors.

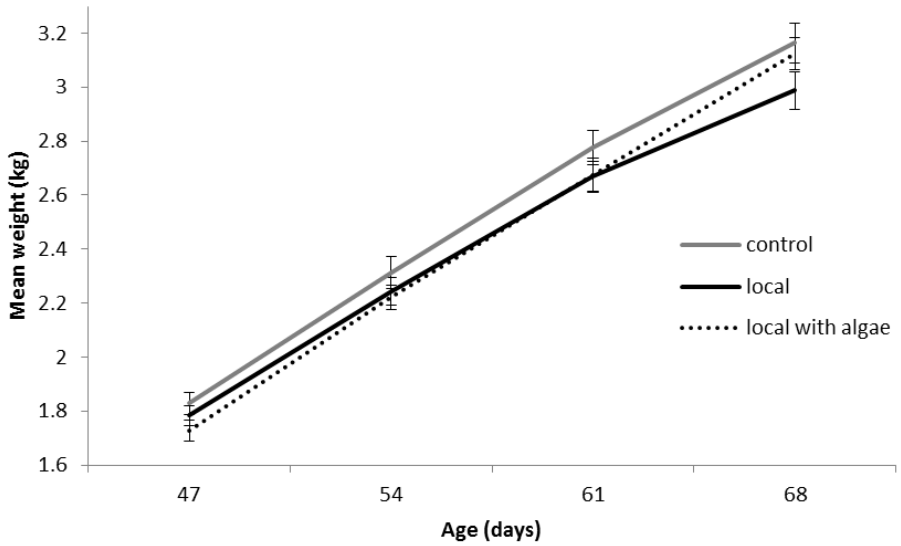

Figure 2: Plot of weight gain for each diet in the winter trial. Error bars shown are standard errors.

From Figure 2 it appears that in the winter trial, while the control and local with algae diets give very similar weights at the end of the weighing period, the local diet may be resulting in slightly lower weights. However, a one-factor ANOVA gave a p value of 0.0875 (F statistic of 3.372 on 2 and 9 degrees of freedom) for the gain between 47 and 68 days, which is not statistically significant at the 0.05% level, although it is worth noting that is closer to being so than the summer trial.

Discussion

The results of both the summer and winter trial showed that there was no significant difference in bird weights between the three diets, indicating that using locally sourced and locally sourced with algae feeds does not impact on broiler productivity. Animal welfare parameters (breast and feet assessments) were recorded and showed no differences between the three feeds (data not shown). Further work is needed to

compare the economic and environmental impact of the ingredients that were included in the trial diets, and this will be carried out within the ICOPP project in the forthcoming year.

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