The effect of canola meals on the performance of broiler chicks

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Abstract

In order to study the effect of replacing different levels of canola meals to soybean meals (0, 5, 10, 15 and 20 percent) on broiler performance with 3 replicates a randomized complete design were used. Average daily gain, feed conversion were measured. At the end of the trail one male and one female of each pen were selected killed and dressing percentage, abdominal fat intestine, liver and gall bladder and pancreas weight were determined. Data from this experiment showed feed conversion and average daily gain of the group used 5 percent canola meal were better than the other groups. The best body weight related to group which percent canola meal. The highest levels of abdominal fat related to groups 15 and 20 percent canola meal used.

Introduction

Canola meal (CM) or Rape seed meal has an excellent balance of amino acids but has lower amino acid digestibility than soybean meal (SBM) (Zuprizal et al., 1992). Previous work has shown that the desolventization/toasting stage of prepress solvent extraction of canola reduces the content and digestibility of amino acids, particularly that of lysine (Newkirk and Classen, 1999; Newkirk et al., 2000). Desolventization is the process of removing the hexane used to extract the oil in a desolventizer/toaster (DT). It is called a DT because it not only desolventizes the meal but it also imparts a toasting process to reduce the level of heat-labile anti-nutritional factors in the meal. The Schumacher DT is the most prevalent design in North America and consists of a series of heated trays stacked vertically. The solvent-laden meal is conveyed onto the top tray and falls from tray to tray until exiting to a drier-cooler with low residual hexane levels remaining. The first trays are internally heated with steam, thereby heating the meal indirectly and causing the majority of the solvent to evaporate. The final trays apply direct heat in the form of sparge steam injected directly into the meal. This steam condenses and increases the moisture content of the meal exiting the DT to approximately 14.5 to 18.5%. Upon entering the DT, the solvent-extracted CM is yellow, but at exit CM is brown, indicating the Maillard reaction is occurring in the process (Newkirk and Classen, 1999). The extent of the Maillard reaction is shown by the lower lysine content and digestibility of toasted meal (Newkirk and Classen, 1999). Optimal conditions for the Maillard reaction have been defined previously in other proteinaceous products as being between 15 to 18% moisture in combination with elevated temperatures (Mauron, 1981). Because sparge steam increases the moisture content, it may contribute to losses in amino acid content and digestibility during desolventization. Therefore, elimination of additional moisture in the form of sparge steam during desolventiza-tion/toasting may result in yellow meal with an elevated concentration of amino acids and enhanced digestibility.It is not known, however, if the toasting process imparted by the sparge steam is necessary to reduce heat-labile antinutritional factors in the meal and, therefore, required to optimize the nutritional value of the meal. The objectives of the current experiment were to determine if elimination of sparge steam during desolventization would reduce the level of browning and toasting of the meal and to determine if the toasting process imparted by the sparge steam is required to reduce anti-nutritional factors and, therefore, optimize broiler performance**.**

Material and methods

240 1-d-old commercial broiler chick (Ross) were weighted, distributed randomly to 5 treatments with 3 replicates., the experiment was arranged in a randomized completely design. Four levels of rapeseed meals replacing to soybean meals including 0, 5, 10, 15 and 20 percent. Broilers were growing to 56 days of age.

Means compared with Duncan's Multiple Range Test at ($p<0.05$). The chicks were reared in deep litter on wood hulls in 24 pens 1*1. Feed and water were provided *ad -libitum.* Body weights and feed conversion. The characteristics under investigation were average daily gain, feed conversion ration, in each pen two males and females. At the end of trail one male and female of each pen were selected. The samples killed and dressing percentage heart, pancreas, liver, spleen, proventriculus, gizzard, gall bladder and intestinal weights were determined.

Results and Discussion

Feed Conversion Ratio: The results are presented in Table 2. Feed conversion data showed significant different ($p<0.05$). The results indicated that 15% and 20% rapeseed meals replacing to soybean meals for the feed conversion ratio better than the other groups. The results are in agreement with the result of other researchers (Zeb *et al.,* 1999; Summers *et al.,*1988). Most probably this is due to presence of fishmeal, keeping amino acid moderation and no exchange in anion-cation balancing at the ration. The results indicated replacing rapeseed meals 15% and 20% causes increase feed conversion ratio

because high NSP (non starch polysaccharides) or inhibitor factors in rapeseed meals.

Table1:Composition of starter diets(1-3week)

Item	Control	5%Canola	10%Canola	15%Canola	20%Canola
Corn	63.86	58.95	56.48	51.08	52.03
Soybean meal	26.97	25.83	22.76	19.7	16.65
Fish meal	6.5	6.5	6.5	6.5	6.5
Canola meal	0	5	10	15	20
Fat	0.32	1.61	2.26	2.92	3.02
DCP	0.56	0.48	0.46	0.43	0.4
Oyster shell	0.97	0.88	0.83	0.77	0.7
Mineral premix	0.25	0.25	0.25	0.25	0.25
Vitamin premix	0.25	0.25	0.25	0.25	0.25
DL-Methionine	0.11	0.05	0.02	0	0
Salt	0.2	0.2	0.2	0.2	0.2
CalculatedComposition					
ME (kcal/kg)	2950	2950	2950	2950	2950
CP(%)	21.2	21.2	21.2	21.2	21.2
Ca(%)	0.92	0.92	0.92	0.92	0.92
Total P(%)	0.41	0.41	0.41	0.41	0.41
Met+ Sys(%)	0.83	0.83	0.83	0.84	0.84
Lysine(%)	1.19	1.2	1.2	1.2	1.2

Table 2: Composition of grower diets(3-6Week)

Item	Control	5%Canola	10%Canola	15%Canola	20%Canola
Corn	70.46	64.46	64.41	62.3	53.88
Soybean meal	22.18	12.63	10.57	13.59	16.5
Fish meal	5	5	5	5	5
Canola meal	0	5	10	15	20
Fat	.05	1.09	1.63	2.19	2.7
DCP	0.65	0.41	0.32	0.29	0.3
Oyster shell	0.94	0.97	0.92	0.93	0.92
Mineral premix	0.25	0.25	0.25	0.25	0.25
Vitamin premix	0.25	0.25	0.25	0.25	0.25
DL-Methionine	.02	0	0	0	0
Salt	0.2	0.2	0.2	0.2	0.2
CalculatedComposition					
ME (kcal/kg)	3000	3000	3000	3000	3000
CP(%)	18.75	18.75	18.75	18.75	18.75
Ca(%)	0.84	0.84	0.84	0.84	0.84
Total P(%)	0.38	0.34	0.33	0.33	0.33
Met+ Sys(%)	0.67	0.7	0.73	0.75	0.75
Lysine (%)	1	1.01	1.02	1.03	1.04

Body weight: The results are presented in Table 3. There is no significant difference (P>0.05) from level 5% to level 15% in body weight between experimental groups in the comparison with control. The results are in agreement with the result of other researcher (Zeb *et al.,* 1999; Summers *et al.,* 1988). Most probably this is due to presence of fish meal, keeping amino acid moderation and no exchange in anion-cation balancing at the ration. Roth Maier *et al*. (1988) indicated that use of 5, 10, 15, 20 and 25 percents of full-fat Canola seed in the broiler ration has the negative effect on the chicken growth so that, body weight in experimental groups in comparison with control has showed 6.7-24% reduction. Researcher has mentioned the decreasing of feed consumption is the cause of body weight decreasing (Sosulski, 1974; Roth Maier *et al*., 1988). According to Najib and Al-Khateeb (2004) with the exception of protein level, canola seed are very much similar to canola meal. High level oil in Canola seed in comparison to its meal, will cause meal and fish meal in starter diet and low level protein ratio, had adjusted feed consumption in experimental and control groups from 1 to 21 days of study. This issue does not support some results of researchers and with some other has conformity. This is in such a manner hat it has no conformity with the results of researches (Roth Maier *et al*., 1988; Lee *et al.*, 1984 and Nassar and Arscott, 1986). Roth Maier *et al*. (1988) used 5, 10, 15, 20 and 25 full-fat canola seed in the broiler diets, has observed that increasing proportion of Canola seed in the diet reduce continuously performance. No particular cause has been reported for decreasing of feed consumption yet, but the existence of phytic acid in canola seed and meal will cause reduction in calcium ability absorption and consequently, the feed consumption reduction (Semmers *et al.*, 1988). The results of this study support other studies (Semmers *et al.,* 1988; Semmers *et al.*, 1977;

Clark *et al.*, 2001). Zeb *et al.* (1999) reported that due to securing of amino acids in ration, feed consumption will not show any reduction by adding canola meal. Also, Hill (1979) has reported. The results are presented in Table 5. body weight are shown 5% replacing canola meal better than other groups and was significant(P>0.05). Percent of carcass wasn't significant effect at the end of experiment. Percent of Abdominal fat are shown the groups 15% and 20% replacing canola meal significant effect(P>0.05) and higher than other groups. Inhibitor factors causes increase abdominal fat because inhibited basal metabolism (4). Percent of gall bladder and intestine wasn't significant effect in all groups. Percent of pancreas are shown the group 20% replacing canola meal significant effect(P>0.05) with other group.

Table 3: Composition of finisher diets(6-8Week)

Item	Control	5%Canola	10%Canola	15%Canola	20%Canola
Corn	70.81	67.64	65.6	63.56	65.89
Soybean meal	21.42	16	13.28	10.56	7.86
Fish meal	3	3	3	3	3
Canola meal	0	5	10	15	20
Fat	1.46	2.58	3.12	3.66	4.2
DCP	0.42	0.45	0.43	0.4	0.4
Oyster shell	1.18	1.06	1.02	0.98	0.95
Mineral premix	0.25	0.25	0.25	0.25	0.25
Vitamin premix	0.25	0.25	0.25	0.25	0.25
DL-Methionine	0.02	0	0	0	0
Salt	0.2	0.2	0.2	0.2	0.2
Calculated Composition					
ME (kcal/kg)	3084.9	3084.9	3084.9	3084.9	3084.9
CP(%)	17.35	17.35	17.35	17.35	17.35
Ca(%)	0.77	0.77	0.72	0.77	0.77
Total P(%)	0.28	0.29	0.29	0.29	0.29
Met+ Sys(%)	0.59	0.68	0.68	0.77	0.77
Lysine (%)	0.89	0.86	0.85	0.84	0.84

Table 4: Effect of dietary treatments on body weight gain and feed Conversion ratio

Item	Control	5%Canola	10%Canola	15%Canola	20%Canola
Body weight gain (g)					
0-3Week	27.36^{a}	37.02^{a}	27.23^{a}	26.9^{a}	24.2^{b}
3-6Week	53.43^{a}	50.02^{b}	54.5^{a}	53.03^{ab}	48.02^{b}
6-8Week	80.05^{a}	85.04^{b}	83.01^{ab}	78.01^{a}	72.05^{c}
0-8Week	52.1^{a}	56.01^{a}	53.2^{a}	44.02^{b}	42.05^{b}
Feed conversion ratio					
0-3Week	1.93	1.94	2.04	2.08	2.12
3-6Week	2.04^{a}	2.01^{a}	2.3^{b}	2.19^{b}	2.23^{b}
6-8Week	2.51^{a}	2.38^{a}	2.55^{a}	2.7^{b}	2.85^{b}
0-8Week	2.07^{a}	2.05^{a}	2.12^{a}	2.32^{b}	2.45^{b}

Table5:Effect of dietary treatments on carcass yield

Item	Control	5%Canola	10%Canola	15%Canola	20%Canola
Body weight (g)	2320.12^{b}	2450^{a}	2340.81^{b}	2112.01^{c}	2001.56^{c}
Carcass (%)	76.83	78.02	76.81	74.22	73.91
Abdominal fat (%)	2.13^{a}	2.28^{a}	2.24^{a}	2.75^{b}	2.81^{b}
Liver & gall bladder (%)	2.57	2.45	2.47	2.36	2.51
Intestinal (%)	4.46	4.36	4.32	4.51	4.6
Pancreas (%)	2.07^{a}	2.05^{a}	2.03^{a}	2.11^{a}	2.61^{b}

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