

The effect of feeding triticale and rape seed products on sensory characteristics of broiler meat

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ABSTRACT

The experiment was with 117 broiler chickens divided into five groups: control (soyabean oilmeal as protein feed) and four experimental fed on varied rations of triticale, rapeseed oilmeal and ground rape seed. The chickens were slaughtered at the age of 8 weeks. The carcasses were processed and stored for six months at -18°C . Sensory examination was carried out on boiled breast and leg muscles.

Diets containing 50% triticale and up to 18% rapeseed oilmeal or 12% of rape seeds did not negatively affect either palatability or flavour of breast meat and boullions. The flavour of leg muscles was affected negatively when chickens were fed on a 50% triticale and 12% rape seeds diet.

KEY WORDS: meat quality, chickens, triticale, rape seeds, rapeseed oilmeal

INTRODUCTION

Triticale and rapeseed oilmeal have become popular in Poland as soya and maize substitutes in broiler feeding (Rutkowski i Gawęcki, 1988a, b). However, some observations have indicated that these feeds negatively affect the palatability and flavour of the meat (Shingari et al., 1976; Tilgner, 1957; Uziębło et al., 1987 a, b; 1988).

Since the dietary contents of triticale and rapeseed meal used in the reported experiments were relatively high, it seemed interesting to evaluate the effect of these components at two levels of inclusion and to compare diets containing rapeseed oilmeal and whole ground rape seeds.

MATERIAL AND METHODS

One hundred and seventeen chickens were randomly divided into control (No. 1-24) and four experimental groups as follows: No. 2 - 23, No. 3 - 24, No. 4 - 26 and No. 5 - 20 birds. They received different amounts of triticale,

TABLE 1

Components and chemical composition of feed mixtures, %

Indices	Starter					Finisher				
	Group No									
	1	2	3	4	5	1	2	3	4	5
Ingredients										
Ground maize	41.0	14.0	11.0	8.0	8.0	36.0	10.0	15.0		
Ground wheat	9.0	8.0	16.0	–	–	25.0	14.0	15.0	9.0	15.0
Ground winter triticale	–	25.0	–	42.0	–	–	35.0	–	50.0	–
Ground spring triticale	–	–	26.0	–	47.0	–	–	35.0	–	50.0
Soyabean oilmeal	30.0	13.0	21.0	14.0	18.0	19.0	9.0	12.0		11.0
Rapeseed oilmeal	–	15.0	–	13.0	–	–	10.0	–	18.0	–
Ground rapeseed	–	–	12.0	–	12.0	–	–	10.0	–	12.0
Fish meal	3.0	4.0	4.0	5.0	5.0	4.0	3.0	4.0	3.0	4.0
Meat and bone meal	–	–	–	–	–	2.0	2.0	3.0	3.0	2.0
Skimmed milk powder	2.0	2.0	3.0	–	3.0	–	–	–	–	–
Dried yeast	3.0	3.0	3.0	2.0	3.0	–	–	–	–	–
Fat concentrate „Celat”	8.0	8.0	–	8.0	–	8.0	7.0	–	8.0	–
Dehulled oats	–	4.0	–	4.0	–	–	4.0	–	4.0	–
Grass meal	–	–	–	–	–	3.0	3.0	3.0	2.0	3.0
Chemical composition										
Dry matter	87.7	87.4	86.8	87.4	86.8	88.3	87.4	86.8	86.9	86.9
Crude protein	23.1	22.7	22.0	22.1	22.2	19.8	19.3	19.3	19.2	19.7
Ether extract	3.7	3.8	5.4	4.5	6.2	4.6	4.4	6.5	5.4	6.5
Crude fibre	4.9	5.8	5.5	5.4	4.2	4.6	4.6	4.7	4.2	4.3
Ash	7.6	6.8	6.0	7.7	7.5	6.1	6.0	5.7	6.2	5.6
Calcium	1.4	1.2	1.2	1.3	1.6	1.1	1.0	1.0	1.0	1.0
Phosphorus	0.8	0.8	0.8	0.9	0.9	0.6	0.7	0.6	0.8	0.6
Metabolizable energy, MJ	11.7	11.7	12.3	11.7	12.4	11.8	11.8	12.4	11.5	12.1

rapeseed oilmeal and ground rape seeds in the diets (Table 1). The broilers were slaughtered at the age of 8 weeks and the carcasses were processed according to the technology used by the meat industry in Poland. After cooling, the carcasses were packed into plastic bags and stored for six months at -18°C .

Sensory analysis was carried out individually on boiled breast and leg muscles. The meat and bouillons were tested after Baryłko-Pikielna's (1975) and Tilgner's (1957) sensory methods by a panel of 5 persons of proven sensory abilities (Polish Standard – 65/A). The meat test included: colour, structure, flavour (intensity and appetite augmentation quality), palatability, tenderness and juiciness. Bouillons were evaluated according to their colour, clarity, flavour and palatability.

Every sample and characteristic was assessed independently and graded using a 5 degree scoring system (5 – the best). The results were analysed using simple analysis of variance (Ruszczyc. 1970).

RESULTS

The results are summarized in Table 2. No statistically significant differences between the groups were found for each characteristic of breast muscles, while in leg muscles the flavour desirability in birds fed a higher level of triticale and rape seed grain (group No. 5) was significantly lower than in control chickens and in birds fed lower levels of these feeds (groups No. 1 and 3, respectively). However, when all eight traits were taken into account, a small but distinct tendency for higher scores of both breast and leg muscles of chickens fed on rapeseed (group No. 3) than of birds fed rapeseed oilmeal (group No. 2) was observed. Only the intensity and desirability of the flavour of breast muscles were scored slightly lower in birds fed on rape seed than on rapeseed meal.

TABLE 2

Scores for cooked breast and leg muscles

Indices	Breast muscles					Leg muscles				
						Group No				
	1	2	3	4	5	1	2	3	4	5
Colour	3.90	3.92	3.93	3.83	3.98	3.80	3.77	3.83	3.73	3.80
Structure	3.69	3.62	3.85	3.65	3.73	3.87	3.76	3.88	3.78	3.83
Flavour-intensity	3.79	3.78	3.72	3.69	3.64	3.92	3.81	3.83	3.77	3.77
Flavour-desirability	3.91	3.92	3.90	3.80	3.79	3.93 ^a	3.86	3.96 ^b	3.85	3.76 ^{ab}
Tenderness	3.45	3.46	3.53	3.48	3.39	3.78	3.80	3.90	3.74	3.89
Juiciness	3.32	3.30	3.42	3.37	3.39	3.80	3.90	3.93	3.72	3.89
Palatability-intensity	3.50	3.41	3.48	3.48	3.49	3.61	3.75	3.72	3.61	3.72
Palatability-desirability	3.72	3.58	3.68	3.70	3.53	3.72	3.79	3.89	3.75	3.78

Means with the same letter are significantly different at $P \leq 0.05$

The leg muscles of chicken given diet No. 3 with a lower level of triticale and rapeseed scored the highest number of grades 4 for flavour desirability (Table 3).

TABLE 3

Frequency of scores of leg muscle's flavour desirability

Scores	Group No									
	1		2		3		4		5	
	no	%	no	%	no	%	no	%	no	%
2.6-3.5	-	-	3	13	1	4			2	10
3.6-3.9	14	58	12	52	10	42	16	62	16	80
4.0-4.3	10	42	8	35	13	54	10	38	2	10
Total	24	100	23	100	24	100	26	100	20	100

TABLE 4

Scores for bouillon from breast and leg muscles

Indices	Breast muscles					Leg muscles				
						Group No				
	1	2	3	4	5	1	2	3	4	5
Clarity	4.2	4.3	4.3	4.2	4.3	3.6	3.5	3.6	3.6	3.6
Colour	3.9	4.0	4.0	3.9	4.0	4.0	3.9	3.9	3.9	3.8
Flavour-intensity	3.7	3.7	3.7	3.7	3.7	3.9	3.8	3.8	3.7	3.7
Flavour-desirability	3.8	3.8	3.8	3.8	3.8	3.9	3.9	3.9	3.8	3.7
Palatability-intensity	3.6	3.6	3.6	3.6	3.6	3.7	3.6	3.8	3.6	3.7
Palatability-desirability	3.6	3.6	3.6	3.6	3.6	3.8	3.7	3.8	3.7	3.8

Sensory evaluation of bouillons prepared from breast and leg muscles did not reveal any significant effect of the diets (Table 4).

DISCUSSION

The observations of some workers on the unfavourable influence of triticale and rape seed products on the quality of broiler meat was not confirmed in this experiment. Only in the chickens fed the higher level of triticale and rapeseed did the leg muscles have a significantly less acceptable flavour than from the control birds and chickens fed a lower level of triticale. Feeding full-fat rape seed affects the fat content and fatty acid composition of broilers (Smulikowska et al. 1990). This may explain the slight general tendency for higher meat quality, except flavour, in birds fed on rapeseed than on rapeseed oilmeal. The lower scoring of flavour of leg muscles in chicken fed on the higher triticale and full fat rape seed diet may indicate that some autooxidation of fat could take place during a long period of storage. Fat oxidation results in an undesirable flavour and sensory changes in meat (Działoszyński, 1958).

A dietary level of 12 per cent of rape seed is probably close to the upper acceptable level.

CONCLUSIONS

Diets containing 50% triticale an up to 18% of ground rapeseed oilmeal or 12% of rape seeds did not negatively affect either palatability or flavour of breast meat and bouillons evaluated after 6 months of storage at -18°C .

The flavour of leg muscles was affected negatively when chickens were fed on a 50% triticale and 12% rape seed diet.

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STRESZCZENIE

Ocena sensoryczna mięsa kurcząt brojlerów żywionych mieszankami z udziałem pszenżyta i rzepaku

Doświadczenie przeprowadzono na 117 kurczętach-brojlerach, podzielonych na pięć grup: kontrolną (podstawową paszą białkową była śruta sojowa poekstrakcyjna) i cztery doświadczalne, otrzymujące w dawkach różną ilość pszenżyta, śruty rzepakowej poekstrakcyjnej i mielonych nasion rzepaku. Kurczęta ubito w 8 tygodniu życia i po sprawieniu tuszki przechowywano przez 6 miesięcy w temperaturze -18°C . Po rozmrożeniu i ugotowaniu oceniano sensorycznie mięśnie piersiowe i udowe oraz buliony z tych mięśni.

Skarmianie dawek zawierających 50% pszenżyta i do 18% poekstrakcyjnej śruty rzepakowej lub do 12% nasion rzepaku nie wpłynęło ujemnie na pożądalność zapachu mięśni piersiowych i bulionów. Dawki zawierające 50% pszenżyta i 12% nasion rzepaku spowodowały pogorszenie smakowitości mięśni udowych.