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THE EFFECT OF DIFFERENT TYPE OF FATS UTILIZATION IN BROILER (308) FEEDING ON THE PERFORMANCE PARAMETERS

DOPAD VYUŽÍVANIA RÔZNYCH DRUHOV TUKOV VO VÝŽIVE BROJLEROVÝCH KURČIAT NA ICH VÝKONNOSTNÉ PARAMETRE

Hasan A. MOHAMMED, Erika HORNIAKOVÁ

Slovak University of Agriculture in Nitra

The aim of this study is to find the influence of utilization of these kinds of fats and their mixing with different levels on broilers some parameters of production performance. In this work we investigated the effect of three types of fat in the diet of broiler (*Ross-308*) chickens on performance properties. One-day 800 chickens were divided into four testing groups: C (5% packed fat), T1 (2.5 % packed fat +2.5% sunflower oil), T2 (2.5% packed fat+2.5% rapeseed), T3 (2.5% packed fat +1.25 rapeseed +1.25% sunflower oil). There were insignificant differences ($P > 0.05$) for live weight (LW) and daily weight gain (DWG) at all periods of breeding and both sexes except finisher period for male where there were significant differences ($P < 0.05$). The highest value for LW was obtained in C group for males 3.027 kg and 2.522 kg for females. The highest DWG was achieved in group C for males; and for females all tested groups were lower than for males. Insignificant differences ($P > 0.05$) were documented for feed intake (FI). All tested groups consumed less feed than C group. There were significant differences ($P < 0.05$) for feed conversion ratio (FCR) at all periods of breeding and for both sex except finisher period for female where there were significant differences ($P < 0.05$). For production index (PI), there were significant differences ($P < 0.05$) among all treatments in both sexes.

Key words: broiler, nutrition, type of fats and productivity

The fats usually used in poultry feeds are tallow and vegetable oils, such as soybean oil, rapeseed oil, coconut oil or corn oil are added, depending on the cost and location were these oils are available. Use of fats for animal feed has many advantages. Concentrated sources of energy serve as the main method of increasing the energy content of diets for increased growth rates. For increased feed efficiency and decreased feed intake, sources of linoleum acid are used. Decreased dustiness of feeds will reduce dust losses and lubricants for the equipment in feed mills. Increased palatability of feeds will results in increased rates of gain and it can decrease age at market. Throughput costs of housing systems have to be considered. Lower heat increment during heat stress keeps caloric intake up, and may slow gut transits of other feeds, resulting in increased digestibility. This may be shown as an „extra caloric“ effect and may be more cost effective than other energy sources. The concentrated feeds can decrease transportation costs for feed delivery. Obtaining the high body weights means getting a large amount of meat produced from broilers. The previous studies have observed that adding fat to feed leads to some improvements in the growth rate due to increased feed intake in broilers and chicken eggs (Ibrahim, 2000). Daghir (1973) and Ensiminger et al. (1990) showed that adding oil or fat to feed will increase the ability of birds to steer consumption. We have to accept the appetite of the bird to feed containing fat or oil. As indicated by Mohamed (1995) and Abdel-Hamid (2001), while adding two levels of fat to the diets of broilers, it brings further improvements of the energy level and also improved feed conversion ratio result. Alhedmi (1994) stated that the production efficiency of broiler meat production directory via PI depends on the final weight at marketing, feed conversion ratio, mortality rate and production costs / kg body weight. These are all based on the quality of feed used along with the content of fat or oil.

Material and methods

The experiment was conducted in testing station (Vígľaš), research farm with 800 broiler chickens of the (Ross 308) line. This experiment was done at the basis of the work concluded between the Central Control and Testing Institute of Agriculture in Bratislava and University experimental farm in Kolíňany. Isocaloric and isonitrogenous diets formulated by the use of the program (G7 2000) are based on least cost design. The feeding duration is 7 days for pre-starter, 9 days for starter, 17 days for grower, and 5 days for finisher. Chemical analysis of the feed mixtures is presented in tables 1, 2, 3 and 4.

Broiler chickens were kept under the Ross recommended procedure; water and rations were distributed *ad libitum* and uniform light provided 24 hours daily. The temperatures of the house and vaccination programme applying are based on broiler live breeding period raisers' recommendations. Chickens in the course of the trial were housed on the deep litter in the same technological conditions. Microclimate indicators in the range of temperature and humidity were measured and recorded three times a day, at 7.00 am, 12.00 and 17.00 pm.

The measurement was indicated in the zone of animals, in the height from the floor, where is the largest part of the body of animals. LW (live body weight) was determined by weighing individual chickens overnight at age of 42 days with an accuracy of ±5 grams. Initial body weights were similar among groups, prior to diet allocation (average = 41 g/bird). DWG (daily weight gain) was calculated in grams (g) by dividing the living body weight gained in feeding period by the number of the days. FI (feed intake) was calculated on day 42. Daily feed consumption was recorded at the end of the feeding periods

Table 1 Nutrient composition of pre-starter feed mixture

Nutrients (1)	Units (3)	Groups (2)			
		C	T1	T2	T3
Dry matter (4)		89.77	90.11	89.11	90.88
Crude protein (5)		23.69	23.17	23.36	23.48
Crude fat (6)		7.57	8.03	8.09	8.23
Crude fiber (7)		2.8	2.6	2.9	2.9
Ash (8)	%	6.31	6.43	6.45	6.33
Non nitrogen nutrients (9)		48.3	48.3	46.9	46.7
Organic nutrients (10)		83.46	83.68	83.37	84.55
Sugar (11)		3.48	4.13	3.94	4.03
Starch (12)		35.54	36.31	35.35	36.85
Calcium (13)		11.023	11.920	11.582	11.107
Total phosphor (14)	g.kg^{-1}	7.417	7.500	7.417	7.500
Sodium (15)		18.1	18.2	19.0	18.5
Magnesium (16)		2.202	2.326	2.268	2.238
MEN (17)	MJ.Kg^{-1}	12.702	12.946	12.811	13.140

Tabuľka 1 Obsah živín v predštartérovej kŕmnej zmesi
(1) živiny, (2) skupiny, (3) jednotky, (4) sušina, (5) N-látky, (6) tuk, (7) vláknina, (8) popol, (9) nebielkovinové N-látky, (10) organická hmota, (11) cukor, (12) škrob, (13) vápnik, (14) celkový fosfor, (15) sodík, (16) horčík, (17) metabolizovateľná energia

Table 2 Nutrient composition of starter feed mixtures

Nutrients (1)	Units (3)	Groups (2)			
		C	T1	T2	T3
Dry matter (4)		90.16	90.07	89.86	90.69
Crude protein (5)		22.01	21.46	21.76	22.06
Crude fat (6)		7.63	8.91	7.88	8.00
Crude fiber (7)		2.3	3.0	2.4	2.2
Ash (8)	%	5.94	6.93	6.01	5.98
Non nitrogen nutrients (9)		50.1	49.2	49.1	49.8
Organic nutrients (10)		84.22	83.14	83.85	84.71
Sugar (11)		3.74	3.84	3.65	4.03
Starch (12)		38.54	36.98	38.85	39.05
Calcium (13)		10.943	13.772	10.785	10.665
Total phosphor (14)	g.kg^{-1}	7.500	7.417	6.917	7.084
Sodium (15)		18.10	18.20	19.00	18.50
Magnesium (16)		2.236	2.499	2.143	2.227
MEN (17)	MJ.Kg^{-1}	12.950	13.057	13.052	13.208

Tabuľka 2 Obsah živín v štartérovej kŕmnej zmesi
(1) živiny, (2) skupiny, (3) jednotky, (4) sušina, (5) N-látky, (6) tuk, (7) vláknina, (8) popol, (9) nebielkovinové N-látky, (10) organická hmota, (11) cukor, (12) škrob, (13) vápnik, (14) celkový fosfor, (15) sodík, (16) horčík, (17) metabolizovateľná energia

Table 3 Nutrient composition of grower feed mixtures

Nutrients (1)	Units (3)	Groups (2)			
		C	T1	T2	T3
Dry matter (4)		90.44	89.94	89.69	89.75
Crude protein (5)		19.28	19.89	19.20	19.35
Crude fat (6)		7.36	7.54	7.41	7.64
Crude fiber (7)		2.8	3.0	3.0	2.5
Ash (8)	%	5.76	5.63	5.63	5.67
Non nitrogen nutrients (9)		52.3	52.3	52.2	52.8
Organic nutrients (10)		84.68	84.31	84.06	84.08
Sugar (11)		3.65	3.74	3.74	3.84
Starch (12)		40.43	40.02	40.44	41.00
Calcium (13)		10.943	13.772	10.785	10.665
Total phosphor (14)	g.kg^{-1}	7.500	7.417	6,917	7.084
Sodium (15)		16.00	15.50	16.70	16.30
Magnesium (16)		90.44	89.94	89.69	89.75
MEN (17)	MJ.Kg^{-1}	19.28	19.89	19.20	19.35

Tabuľka 3 Obsah živín v kŕmnej zmesi pre rastúce kurčatá
(1) živiny, (2) skupiny, (3) jednotky, (4) sušina, (5) N-látky, (6) tuk, (7) vláknina, (8) popol, (9) nebielkovinové N-látky, (10) organická hmota, (11) cukor, (12) škrob, (13) vápnik, (14) celkový fosfor, (15) sodík, (16) horčík, (17) metabolizovateľná energia

Table 4 Nutrient composition of finisher feed mixtures

Nutrients (1)	Units (3)	Groups (2)			
		C	T1	T2	T3
Dry matter (4)		89.39	89.40	89.25	89.40
Crude protein (5)		17.73	17.86	17.61	17.76
Crude fat (6)		7.30	7.26	7.51	7.37
Crude fiber (7)		2.5	2.4	2.8	2.4
Ash (8)	%	5.39	5.39	5.44	5.45
Non nitrogen nutrients (9)		54.6	54.7	54.9	54.4
Organic nutrients (10)		84.00	84.01	83.81	83.95
Sugar (11)		3.46	3.17	3.26	3.04
Starch (12)		43.89	43.37	43.53	43.61
Calcium (13)		10.366	10.739	10.467	10.273
Total phosphor (14)	g.kg^{-1}	6.367	6.100	5.834	6.00
Sodium (15)		14.4	14.2	13.5	15.8
Magnesium (16)		2.293	2.296	2.285	2.236
MEN (17)	MJ.Kg^{-1}	1.3	1.3	1.3	1.3

Tabuľka 4 Obsah živín vo finálnej kŕmnej zmesi
(1) živiny, (2) skupiny, (3) jednotky, (4) sušina, (5) N-látky, (6) tuk, (7) vláknina, (8) popol, (9) nebielkovinové N-látky, (10) organická hmota, (11) cukor, (12) škrob, (13) vápnik, (14) celkový fosfor, (15) sodík, (16) horčík, (17) metabolizovateľná energia

and the daily consumption was calculated by dividing total FI on the number of the days for each period. FCR was calculated on day 42. The chickens were inspected daily and dead birds were removed following registration of date and body weight. Feed Conversion Ratio (FCR) was calculated as the DWG (g) per FI (g). When calculating FCR, the body weights of dead birds were also considered. It was calculated on day 42. For the statistical design and data analyses, complete random design and experiment with 4 treatments were determined. Data in all experiments were subjected to ANOVA procedures appropriate for a completely randomized design and the significance of differences between the means estimated using Duncan test (Duncan's new multiple range test). Significance in all comparisons in chemical parameters was under probability level ($P < 0.01$) considered. Values in percentage were subjected to transformation of Arc sin v100. All statistical analyses were performed using the software SPSS 17.5 for Windows® (SPSS Inc., Chicago, IL).

Results and discussion

Obtained data on LW for male and female chickens are presented in table 5. In male chickens, during all experimental periods except last period (Finisher period) there were insignificant differences (P > 0.05) among groups.

At finisher phase the highest value was obtained in group C (3.027kg) and followed by T1 (2.971 kg). The lowest value was in group T2 (2.816 kg). This may attribute with increasing secretion of androgen hormone which is related with growth hormone (Hausman et al., 2009). We can speculate that these findings are due to the advantage of age where the animal will improve of bile salt. This can be more digestive and metabolic fats will reflect on adipose fat and accumulation in body lead to increase body weight. On the other side there were insignificant differences (P > 0.05) between all groups for the female. Similar results were achieved by Mohammed et al. (2005) at the finisher period for all groups except C group as observed in table 6. The average value of daily weight gain was for male group C 144.55g.day^{-1} versus 136.90, 134.60 and 129.150 g.day^{-1} for T1, T3 and T2, respectively. This means the daily weight gain has gradual affect to final weight for all groups by accumulation of fat in body. The animal metabolism is controlled by a variety of hormones that form a complex system which directly affects growth. Among hormones, growth hormone (GH), insulin like growth factor-1 (IGF-1), insulin, triiodothyronine and thyroxine have been reported to be involved in broiler growth control (Scanes et al., 1985). The final growth expression is the result of interactions between nutritional, environmental, and genetic factors with endocrine secretions. The final live body weight of the chickens in group C and T1 for male and female were higher than in other groups. This could be attributed to the high consumption of the diet of these groups compared to other groups (Table 7). Kenny (2004) concluded that use of oil as a main source of energy in diet leads to the decrease of body weight due to combined complex fatty acids effect of protein digestive. These results also agree with results of Mateos et al., (2003). The data from this study also indicate a trend towards improved body weight gain in male chickens. In female and male there were insignificant differences (P > 0.05) among groups at periods from pre-starter till grower for LW, DWG and FI. In male at finisher periods there were significant differences (P < 0.05) as mentioned before. On the other side there were insignificant differences (P > 0.05) for females at finisher period also for BW, DWG and FI. It must be pointed out that there were mathematical differences at all periods for precedent characters that T1 mostly have higher value than values of T2 and T3. This can be attributed to type of

Table 5 The effect of different dietary treatments on live body weight of broilers

Periods (1)	Dietary treatments (2)			
	C	T1	T2	T3
Body weight in kg of male chicken (3)				
Pre-starter (4)	0.143±.01	0.142±.01	0.141±.007	0.137±.01
Starter (5)	0.597±0.09	0.599±0.04	0.578±0.03	0.565±0.04
Grower (6)	2.304±0.06	2.287±0.01	2.199±0.01	2.181±0.02
Finisher (7)	3.027±0.02^{b}	2.971±0.11^{ab}	2.816±0.14^{a}	2.854±0.15^{ab}
Body weight in kg of female chicken (8)				
Pre-starter (4)	0.143±0.01	0.137±0.01	0.140±0.10	0.134±0.01
Starter (5)	0.561±0.02	0.561±0.03	0.547±0.02	0.530±0.03
Grower (6)	1.962±0.06	2.017±0.11	1.931±0.03	1.927±0.10
Finisher (7)	2.522±0.02	2.544±0.10	2.454±0.10	2.455±0.08

a,b means with different superscript within row are significantly different (P < 0.05) and values will increase from a to c value. Values are *x* ± S D of 200 birds
a,b – rozdielne písmená v rade znamenajú štatistické rozdiely (P < 0,05) a hodnoty majú stúpajúcu tendenciu od a po c. Hodnoty sú uvádzané ako (*x* ± Std) u 200 kurčiat

Tabulka 5 Vplyv rozdielnej výživy na živú hmotnosť brojlerov (priemer ± SD)
(1) obdobie, (2) výživa, (3) živá hmotnosť v kg kohútikov, (4) predštartérová, (5) štartérová, (6) rastová, (7) finálna, (8) živá hmotnosť sliepočiek

Table 6 The effect of different dietary treatments on daily weight gain in g. day^{-1} of broilers

Periods (1)	Dietary treatments (2)			
	C	T1	T2	T3
Male (3)				
Pre-starter (4)	14.853±1.906	14.213±0.890	14.118±0.940	13.433±1.448
Starter (5)	50.498±0.873	50.803±3.423	48.53±2.361	47.498±3.531
Grower (6)	99.938±4.213	99.306±6.347	95.125±6.370	65.082±6.538
Finisher (7)	144.55±12.327^{b}	136.90±9.539^{ab}	129.150±9.154^{a}	134.60±10.09^{ab}
Body weight in kg of female chicken (8)				
Pre-starter (4)	14.173±0.427	13.518±1.322	13.905±1.266	13.025±1.00
Starter (5)	46.912±200	47.08±2.60	45.308±0.932	43.865±2.227
Grower (6)	82.468±2.860	85.630±5.015	81.38±1.501	82.160±4.709
Finisher (7)	112.300±8.927	105.40±6.276	104.55±10.955	105.60±5.985

a,b means with different superscript within row are significantly different (P < 0.05) and values will increase from a to c value. Values are *x* ± S D of 200 birds
a,b – rozdielne písmená v rade znamenajú štatistické rozdiely (P < 0,05) a hodnoty majú stúpajúcu tendenciu od a po c. Hodnoty sú uvádzané ako (*x* ± Std) u 200 kurčiat

Tabulka 6 Denný prírastok v g . deň$^{-1}$ brojlerov (priemer ± SD)
(1) obdobie, (2) výživa, (3) kohútiky, (4) predštartérová, (5) štartérová, (6) rastová, (7) finálna, (8) sliepočky

fat used in the feed stuff in T1 with 2.5% saturated and 2.5% unsaturated this proportion, further type of oil (rapeseed) makes mostly complete of essential FA in feed mixture such as oleic FA. Badinga et al. (2003) compared addition of conjugated linoleic acid (CLA) unsaturated with corn oil. It leads to the high significant differences (P < 0.01) decrees of access weight that added for CLA.

The result with CLA additive was 692±7.6g while for corn oil it was 868 ±7.6g. This is explain even add USA to feed mixture however type of this FA affected on the daily weight gain. Pardio et al. (2001) also agree with this study but for another strain (Cobb500) provided at age 42 days average of live body weight for male and female was 2.009kg. On the other hand this result disagrees with other results (Mohammed et al., 2005), may be because of type of saturated fatty acids. They were obtained at age of 42 days 2.22±0.03 kg and can be attributed to stain affected on these results, too.

In general, table 7 pointed out that feed consumption increase gradually from pre-starter till end of experiment. This is obviously due to increasing of feed required for maintenance and production especially advantage of age for general broiler strain. Results observed that compassion of feed mixture in groups T2 and T3 reach lower value than in groups C and T1 in all period of FI. This can be attributed to formation of complex fatty acids FA. The process of this type of FA ability to change the link to the sites associated with bonds so-called conjugated FA leads to composition of chemical circles of trans-cis that make complex installation this type of FA prevent or inhibit coenzymes to link for the purpose of peptides series form of amino acids such as lysine and methionin. This inhabitation factor leads to irregularity of liver process due to combination of protein from simple and poly peptides and as a result it is reflected on growth of birds (Sadiq, 1996; Gaiotto, 2000).

The obtained data on feed conversion ratio of male and female chickens are presented in table 8. There were significant (P < 0.05) differences found between groups over all experimental periods. These findings agree with previous research carried out by Taraz et al., 2006. At the pre-starter phase for males, the best utilization was obtained in T2 group followed by T1 group compared to the other groups. This could be attributed to the negative effect of continuous inclusion of fat types in the diet during this period which decreased the daily weight gain. In T1 and T2, it was due to the effect of saturated and unsaturated fat components which reduced feed consumption. Popescu and Criste (2003) explained the less availability of essential nutrients when using full fat soybean in broiler diet. At this period the growth of bile salt gland does not grow well and chickens cannot at the first week metabolic of saturated fat. This leads to less amount of metabolic fat in body and reflects the FCR. At the starter phase the best utilization was obtained in T1 group followed by C, T3 and T2 respectively, at this period after week of age chickens' ability to start metabolic of fat because of growth of bile salt gland grows. During grower phase there were significant differences (P < 0.05) among all treatments. The best value was in group T1 (1.238), which may be attributed to the compensatory phenomenon (Leeson and Summers, 1997). During this period after the restriction of the growth rate at starter period with inclusion of high level of energy in group C diets, at the same time C group consumed less feed and gained higher weight, which means best utilization from the diet in this group. Saleh et al. (2003) found similar results where FCR is improved by including saturated and unsaturated fat in broiler diet by reducing the feed intake with adequate energy utilized for growth. At finisher phase the C group has better value for FCR than the other groups. This could be attributed to the advantage of breeding age and diet content of one type of fat while the other groups mix it with unsaturated fat and this leads to a complex situation of metabolic feed and to lowered appetite of birds. On the other hand it may be due to the antiradical and antioxidant effects of saturated fatty acids (such as steric acid, arachidic acid, behenic acid etc) which provide protection to oxidation from lipo- per oxidation. This protection induces an increase in glandular stomach size, leading to a higher absorption surface for nutrients. Moreover, there is a stimulation of digestive enzymes (trypsin, chimotrypsin, lipase, sucrase etc.) in the pancreas and the small intestine; leading to an improvement in protein, fat and carbohydrate digestion (Lesson and Atteh, 1995). The combined actions of the nutrient enzymatic digestion provide a higher bioavailability of the essential components for animal growth (Mazuranok and Ionescu, 2004). Contrary to this finding, Mohammed et al. (2005) reported that using mixture of saturated and unsaturated fat has reverse effects on FCR in broiler's performance. At pre-starter period for female there is the same result for male except groups T2, T3 which have little more value than male. This can be attributed for type of because males of chicks have ability for secretion growth hormone which leads to ability of males to metabolise more food than females and thus it is not role of effect of fat type included in diet. This is due to the effect of growth hormone in males. On the other hand, males are more active than females, which leads to more feed intake and this reflects on FCR (Anjum et al., 2004). At starter period there were significant differences (P < 0.05) between group T1 and the other groups in male results. The best value here is for group T1 (1.315). This can also be attributed to the fact that at the starter period chickens have little ability to improve bladder salt gland and secretion of lipase enzyme. At grower period there were significant differences (P < 0.05) among all groups. The best

Table 7 The effect of different dietary treatments on Feed intake of broiler chickens

Periods (2)	Daily feed consumption in g/bird/day (1)			
	C	T1	T2	T3
Pre-starter (3)	17.69±3.51	16.78±1.97	16.72±1.12	16.72±1.61
Starter (4)	63.66±3.01	62.58±3.43	61.82±1.84	59.84±3.84
Grower (5)	152.25± 5.95	149.35±6.90	145.33±3.08	144.94±8.10
Finisher (6)	221.82±6.55	213.00±9.13	210.91±8.81	210.51±5.26
Total feed consumption (7)	22 771	22 085.5	21 719	21 600.5
Average daily feed consumption (8)	113.86	110.42	108.59	108.00

Tabuľka 7 Vplyv výživy na príjem krmiva
(1) denný príjem krmiva v g/ks/deň, (2) obdobie, (3) predštartér, (4) štartér, (5) rastová, (6) finálna, (7) celkový príjem, (8) priemerný denný prírastok

Table 8 The effect of different dietary treatments on feed conversion ratio in male and female chickens

Periods (3)	Groups (1)			
	C	T1	T2	T3
Male chicks (2)				
Pre-starter (4)	1.190±0.014^{a}	1.185±0.012^{a}	1.180±0.012^{a}	1.245±0.012^{b}
Starter (5)	1.267±0.010^{b}	1.238±0.011^{a}	1.270±0.012^{b}	1.263±0.013^{b}
Grower (6)	1.533±0.013^{b}	1.485±0.013^{a}	1.530±0.011^{b}	2.235±0.012^{c}
Finisher (7)	1.533±0.017^{a}	1.550±0.008^{a}	1.660±0.010^{b}	1.545±0.013^{a}
Female chicks (8)				
Pre-starter (4)	1.248±0.009^{a}	1.245±0.012^{a}	1.200±0.008^{b}	1.263±0.017^{a}
Starter (5)	1.350±0.008^{b}	1.315±0.013^{a}	1.360±0.010^{b}	1.365±0.012^{b}
Grower (6)	1.847±0.013^{d}	1.735±0.013^{a}	1.783±0.013^{c}	1.763±0.013^{b}
Finisher (7)	1.975±0.013	2.023±0.017	2.013±0.013	1.785±0.390

a,b means with different superscript within row are significantly different (P < 0.05) and values will increase from a to c value. Values are x ± S D of 200 birds
a,b – rozdielne písmená v rade znamenajú štatistické rozdiely (P < 0,05) a hodnoty majú stúpajúcu tendenciu od a po c. Hodnoty sú uvádzané ako (x ± Std) u 200 kurčiat

Tabuľka 8 Konverzia krmiva kohútikmi a sliepočkami
(1) skupiny, (2) kohútiky, (3) obdobie, (4) predštartér, (5) štartér, (6) rastová, (7) finálna, (8) sliepočky

value was achieved in groupT1 (1.735) followed by T3,T2 and C groups respectively, at this point we can mention the effect of sex accompanied with type of fat. This results agree with results of Mohammed et al., (2005) but disagree with results of Mala et al., (2003) and Kenny (2004). This may be due to type of strain they use: Cobb500. At finisher periods there were insignificant differences (P > 0.05) among all groups within different periods except the finisher period of males with significant differences (P < 0.05). This can be explained by the effect of sex and Androgen hormone can improve more at finisher period in males whereas it cannot in females. The positive effect of these additives on overall performance in general could be attributed to the content of these additives contributed in the feed such as vitamins which are soluble in fat, minerals, savour (Firman and Remus, 1994), in the diet with antitoxin activities. The comparison between C and T21 shows a negative effect of mixing sunflower oil with packed fat application in broiler diet on feed conversion ratio in male and female chickens in general. Our results disagree with the results obtained by Mohammed et al. (2005) and also with Sanz et al. (2000), as they used saturated and unsaturated fat before slaughtering time in low protein level broiler diets. Our results with males and females in groups fed content packed fat disagree with Mala et al. (2003), as they found insignificant (P > 0.05) low value in FCR of broilers during 42 days old by use of soybean oil, compared to negative control which content tallow fat.

Table 9 Effects of diets on production index profile of broilers groups under experiment

Groups (2)	SEX (1)	
	Female (3)	Male (4)
C	302.79±1.288^{c}	380.86±5.74^{c}
T1	294.81±3.66^{b}	348.23±3.94^{b}
T2	287.81±0.817^{a}	347.89±0.82^{a}
T3	292.51±2.46b	341.18±2.50 b

a,b means with different superscript within row are significantly different (P < 0.05) and values will increase from (a)to (c)value. Values are x ± Std. Deviation of 200 birds
a,b – rozdielne písmená v rade znamenajú štatistické rozdiely (P < 0,05) a hodnoty majú stúpajúcu tendenciu od a po c. Hodnoty sú uvádzané ako (x ± Std) u 200 kurčiat

Tabuľka 9 Vplyv výživy na index produkcie brojlerových kurčiat na konci pokusu
(1) pohlavie, (2) skupiny, (3) sliepočky, (4) kohútiky

Table 9 shows even significant differences (P < 0.05) among all treatments for both sexes for PI, nevertheless, there was higher proportion than the standard average measure which is mentioned above. High value was in C group (302.79 and 380.86) for females and males, respectively. This can be attributed to well-applied instruction of Ross-308 company in breeding by more interesting, rise level of mortality, decrees of general average death with improve of FCR lead to also increasing of live body weight as a main factor of PI.

Conclusion

Based on the results obtained by this study it can be conclude that the utilization of packed fat by individuals does not attenuate the decline in performance of broilers. For optimum body weight by inclusion of the packed fat, administrations of 5% in the diet from pre-starter till 42 days in male chickens should be performed. But for female birds the best utilization possible to obtain is by the blend of mixing packed fat with rapeseed oil (2.5%+2.51%) respectively in the diet up to 35 day and up to 42 day. In the point of male sex, body weight reflected the diverse response to different species of fat in broiler diets as found in the weight gain parameter. Feed consumption improved by including packed fat in the diet and the higher obtained by supplementing 5% of packed fat and mixing 2.5% packed fat with 2.5% rapeseed oil. The best utilization comes from the diet as indicated by the feed conversion ratio obtained by inclusion of 5% packed fat for male and female broiler chicken up to 42 day.

Súhrn

V práci sa testovali rôzne druhy tukov vo výžive brojlerových kurčiat. V kontrolnej skupine bol použitý živočíšny tuk (5%), v skupine T1 2.5% živočíšny tuk + 2,5% slnečnicový olej, v skupine T2 2,5% živočíšny tuk + 2,5% repkový olej a v skupine T3 2,5% živočíšny tuk + 1,25% repkový + 1.25% slnečnicový olej. Výsledky sa hodnotili počas rastu v predštartérovom období (7 dní), v štartérovom (9 dní), v rastovom (17 dní) a vo finálnom (5 dní). V pokuse bolo 800 kurčiat, v každej skupine po 200 ks v štyroch opakovaniach. Pri kohútikoch boli zaznamenané nepreukazné rozdiely (P > 0,05) v živej hmotnosti vo všetkých obdobiach okrem finálneho, kde bol evidovaný preukazný rozdiel

(P < 0,05). Najnižšia živá hmotnosť bola zaznamenaná v skupine T2. Pri sliepočkách všetky rozdiely medzi skupinami, tak ako aj medzi obdobiami boli nepreukazné (P > 0,05). Vyššia hodnota bola v skupine T1 v porovnaní s ostatnými skupinami. V štartérovom období použitý živočíšny tuk vo výžive pozitívne ovplyvnil denný prírastok živej hmotnosti kohútikov. V obidvoch pohlaviach najvyššie hodnoty boli zaznamenané v kontrolnej (C) skupine. Počas rastového obdobia skupiny T2 a T3 boli slabšie v porovnaní s ostatnými skupinami, tak u sliepočiek aj kohútikov. Denný príjem krmiva nebol významne ovplyvnený (P > 0,05) počas celého pokusného obdobia. Všetky pokusné skupiny prijali menej krmiva ako kurčatá v kontrolnej skupine. Najvyšší príjem bol zaznamenaný v skupine C, s následnosťou v skupinách T2 a T3. Konverzia krmiva bola pozitívne ovplyvnená len v rastom období, zatiaľ čo v ostatných obdobiach neboli evidované významné rozdiely (P > 0,05). Najlepšia hodnota v konverzii krmiva bola zaznamenaná vo veku 35 dní a to tak pri kohútikoch ako aj sliepočkách pri porovnaní s ostatnými skupinami. Pri sliepočkách v štartovacom období najlepšiu hodnotu zaznamenala skupina T1. Vo finálnom období boli najlepšie výsledky pre obe pohlavia v skupine C. Produkčný index zaznamenal významné rozdiely medzi všetkými kombináciami výživy a v oboch pohlaviach. Najlepšie hodnoty boli pre kohútiky aj sliepočky v skupine C.

Kľúčové slová: broilery, výživa, druh tuku a produktivity

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Contact address:
doc. Ing. Erika Horniakova PhD; Slovak University of Agriculture, Faculty of Agrobiology and food resources, Department of Animal Nutrition, Tr. A. Hlinku 2, 949 76 Nitra, Slovak republic, e-mail: Erika.Horniakova@uniag.sk; Msc. Hassan Abdullah Mohammed, Tr. A. Hlinku 1200/38 Nitra, Slovak republic, phone: 00 421 944 337 624, e-mail: mohammedhassan335@gmail.com