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THE USE OF COMPOUND FEEDS FOR BROILER AND TURKEY CHICKS FOR REARING PHEASANTS

ZASTOSOWANIE MIESZANEK DLA KURCZĄT BROJLERÓW I INDIKÓW W ODCHOWIE BAŻANTÓW

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Streszczenie. Celem pracy była ocena możliwości zastosowania mieszanek pasz treściwych DKA-S, IB-1, IB-2 produkowanych dla brojlerów kurcząt i indyków w odchowie bażanta zwyczajnego i bażanta złocistego. Badania przeprowadzono na 40 ptakach, w tym na 20 bażanta zwyczajnego i 20 bażanta złocistego. W pierwszym dniu życia zarówno bażanty zwyczajne, jak i bażanty złociste, z obu grup żywieniowych, nie różniły się istotnie masą ciała. W okresie odchovu średnia masa ciała bażanta łownego, żywionego mieszanką IB, była większa od masy ciała bażantów żywionych mieszanką DKA-S; po 4 tygodniach różnica średniej masy ciała wynosiła już ponad 67 g. Po 8 tygodniach bażanty obu grup żywieniowych były wyrównane pod względem masy ciała, która wynosiła 616,78 g w przypadku bażantów żywionych mieszanką IB i 608,14 g w przypadku bażantów żywionych mieszanką DKA-S. Bażanty złociste otrzymujące mieszankę IB przez cały okres odchovu były cięższe od bażantów żywionych mieszanką DKA-S; po 8 tygodniach masa ich ciała wynosiła 401,40 g i była większa od masy ciała bażantów żywionych mieszanką DKA-S o 65,5 g. W okresie doświadczenia średnie dobowe przyrosty masy ciała bażantów łownych i bażantów złocistych były większe przy zastosowaniu mieszanki IB. Ptaki żywione zarówno mieszanką IB, jak i DKA-S charakteryzowały się bardzo szybkim tempem wzrostu w okresie od 1 dnia do 4 tygodnia. Od 5 do 8 tygodnia odchovu wskaźnik tempa wzrostu zmalał i mieścił się w zakresie od 57,95% do 75,45%. Mieszanki dla kurcząt brojlerów i indyków mogą być efektywnie stosowane w odchowie bażantów. Zastosowanie mieszanki IB w żywieniu bażantów daje lepsze wyniki odchovu, zarówno kurcząt bażanta zwyczajnego, jak i kurcząt bażanta złocistego, niż żywienie mieszanką DKA-S.

Key words: pheasant, body weight, mean daily gain values, growth rate index, concentrate consumption.

Słowa kluczowe: bażant, masa ciała, średnie dobowe przyrosty, wskaźnik tempa wzrostu, zużycie paszy.

INTRODUCTION

The principal purpose of pheasant rearing in aviaries is to obtain material for colonisation of natural habitats (Kamieniarz 1999; Górski 2003). A small percentage of raised pheasants is constituted by birds sold to amateur breeders and slaughter birds. The profitability of aviary

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rearing of pheasants is significantly influenced by the diet. The diet should be optimised by devising appropriate feeding systems for a given bird population (Krystianiak and Torgowski 1998; Maciołek and Bąkowska 2005a, b; Kokoszyński et al. 2008). Kokoszyński et al. (2008) have found that pheasants maintained on a diet with a large share of wholegrain wheat attain higher pre-slaughter body weights, higher weights of eviscerated carcasses including necks, but have a lower dressing percentage than pheasants fed entirely with concentrates.

It is not easy to correctly feed pheasants reared in aviaries. It is practically not possible to apply a diet typical of pheasants that develop in natural conditions. A relatively dense spacing of the birds in aviaries and the need for external feed provision makes it necessary to find new ways of feeding pheasants. The feeding of wild birds reared in an isolated man-made environment must fully satisfy the natural needs and enable correct growth and development of the organism. Simultaneously, the pheasant breeder expects bird nourishment to be highly effective and guarantee a quick body weight gain, as well as shortening the production cycle. That is why attempts are being made to adapt the feeding methods and compound feed formulae optimised for domesticated bird species in aviary breeding of related game birds.

The present study was aimed at assessing the possibility of using concentrate mixes intended for broiler chicks and turkeys to feed Common and Golden pheasants.

MATERIAL AND METHODS

The experimental material was constituted by Common and Golden pheasant chicks. Common and Golden pheasant eggs were incubated in BIOS incubators. 100% of the incubated eggs ultimately hatched. Diet analyses were conducted on 40 birds, including 20 Common and 20 Golden pheasants. Half of the chicks of each species represented by 10 Common and 10 Golden pheasants were fed with IB-1 and IB-2 turkey compound concentrates, while the other half were fed with the DKA-S broiler chick concentrate. Thus, 4 groups of chicks were created, including 10 chicks per group, i.e. 2 Common pheasant chick groups and 2 Golden pheasant chick groups. The complete compound feeds were administered to the birds *ad libitum* in the form of fine granulate. During the first week of rearing, the complete compound feeds was ground and administered as a meal. The administered feed had a high nutritional value and good quality. The IB-1 and IB-2 mixes contained: 27.5 and 25.5% total proteins, respectively. The DKA-S compound contained 19% total proteins. Information on the nutritional value of the complete compound feeds is provided in Table 1. One-day-old chicks additionally received LACTAVIT C in order to acidify their neutral GI tracts and populate them with appropriate microflora. Beginning from the 2 week of age, the birds also received fine-cut, young nettle leaves *ad libitum*. In the third week, the diet was enriched with sliced lettuce and Persian clover, administered *ad libitum* as well. The chick diet was supplemented with vitamin complexes and feed supplements: Polfasol B compositum, containing vitamins of the B group, involved in the metabolism of carbohydrate, fat and protein, and vitamins C and K, and Dolfos B providing vitamins (A, D₃, E₁), micro and macro elements (calcium, nicotinic acid, phosphorus, zinc, sodium, manganese, magnesium, copper, sulfur, selenium) necessary for the proper development and functioning of the body. The rearing period lasted 8 weeks.

Table 1. Complete compound feed profile
Tabela 1. Charakterystyka mieszanek pełnoporcjowych

Detailed data Wyszczególnienie	Prestarter IB-1	Starter IB-2	Starter DKA-S
Metabolisable energy [MJ] Energia metaboliczna [kcal]	11.87	12.04	12.14
Total proteins – Białko ogólne [%]	27.50	25.50	19.00
Crude fibre – Włókno surowe [%]	4.50	4.70	5.00
Crude ash – Popiół surowy [%]	7.00	7.00	6.00
Crude fat – Tłuszcz surowy [%]	4.40	5.70	4.00
Ca – Wapń [%]	1.40	1.30	0.95
P-absorb. – Fosfor przyswajalny [%]	0.78	0.65	0.45
Na – Sód [%]	0.16	0.16	0.16
Lysine – Lizyna [%]	1.76	1.53	1.06
Methionine – Metionina [%]	0.71	0.61	0.46
Cysteine – Cysteina [%]	1.11	1.04	0.79
Tryptophan – Tryptofan [%]	0.33	0.30	0.22

Between the 1st and 4th week, the chicks were kept in a brick nursery in 1mx1m boxes whose sizes were controlled and enlarged as the birds grew. Warmth was provided by an artificial sitter under which the temperature was 36°C in the first week, 34°C in the second, and 32°C in the third. Relative humidity was maintained at 60–70%. After 4 weeks, the pheasants were transferred to a wooden nursery with a run. An artificial sitter was the source of warmth in this case as well. The window panes were painted red to prevent feather eating and cannibalism among the birds. In sunny weather, the chicks used the run, previously sowed with Persian clover and sunflower. The feed was administered in poultry feeders.

Collapses, state of health and feed consumption and living conditions were controlled and recorded each day. The body weight of the birds was checked each week. We calculated the mean daily weight gains, growth rate indices, feed consumption during the rearing period, feed consumption per 1 bird and feed consumption per 1 kg of body weight gain. The growth rate index was calculated for the particular rearing periods according to the following formula:

$$K\% = \frac{(Wt - Wo) \cdot 100}{\frac{Wt + Wo}{2}}$$

where:

Wt – final body weight on the day of assessment,

Wo – initial body weight.

The data were analysed according to the criterion of applied compound feed and the pheasant species. The collected material was statistically analysed using the following mathematical model:

$$Y_{ij} = \mu + a_i + e_{ij}$$

where:

Y_{ij} – value of the parameter under analysis,

μ – populational mean,

a_i – effect of feed type,

e_{ij} – error.

RESULTS AND DISCUSSION

During the 8 weeks of rearing, no diseases were observed either in the Common or Golden pheasant group. 4 Common pheasant chicks fell dead on the first day, including 3 in the group fed with the DKA-Starter concentrate and 1 in the group receiving the IB-1 compound feed (Table 2). The reason for the fatalities was an unhealed umbilical cord wound, which was probably associated with a low incubation temperature. High mortality among the pheasant chicks was observed by Znaniecka (1977), who identified a mortality rate of 30% due to late hatching and contagious diseases (*coccidiosis*).

Table 2. Selected indices in rearing Common (*Phasianus colchicus*) and Golden (*Chrysolophus pictus*) pheasant chicks (number of individuals)

Tabela 2. Wybrane wskaźniki odchowu kurcząt bażanta zwyczajnego (*Phasianus colchicus*) i bażanta złocistego (*Chrysolophus pictus*)

Indices Wskaźniki	<i>Phasianus colchicus</i>		<i>Chrysolophus pictus</i>	
	type of compound feed rodzaj mieszanki			
	IB-1, IB-2	DKA-S	IB-1, IB-2	DKA-S
Number of included chicks Liczba piskląt	10	10	10	10
Number of reared birds Liczba ptaków odchowanych	9	7	10	10
Number of collapsed birds Liczba ptaków martwych	1	3	0	0
Mortality Śmiertelność [%]	10	30	0	0
Survivalrate Przeżywalność [%]	90	70	100	100
Mortality Śmiertelność [%]				
1st day – 4th week 1dzień – 4 tydzień	10	30	0	0
5th – 6th week 5–6 tydzień	0	0	0	0
7th – 8th week 7–8 tydzień	0	0	0	0

IB-1, IB-2 – concentrate mixes produced for turkey chicks – mieszanki dla brojlerów indyjskich, DKA-S – concentrate mixes produced for broiler chicks – mieszanka dla kurcząt brojlerów.

Tables 3 and 4 contain juxtapositions of data relating to the body weight of the chicks in the successive weeks of rearing. One-day-old Common and Golden pheasant chicks in both diet groups did not significantly differ in body weight. The mean body weight of Common pheasants fed with the IB concentrate was higher than the body weight of the pheasants fed with DKA-S. After 4 weeks, the mean body weights of the birds fed with the different concentrates differed by over 67 g. After 7 weeks of rearing, the body weights of the Common pheasants fed with the different concentrates were more similar, with only slight, statistically unconfirmed, differences.

Table 3. Body weight of the Common pheasant (*Phasianus colchicus*) chicks in the successive weeks of rearing, depending on the applied compound feedTabela 3. Masa ciała kurcząt bażanta zwyczajnego (*Phasianus colchicus*) w kolejnych tygodniach odchowu, w zależności od zastosowanej mieszanki

Age of chicks Wiek kurcząt		Type of compound feed Rodzaj mieszanki		LSD _{0,05} NIR _{0,05}	LSD _{0,01} NIR _{0,01}
		IB-1, IB-2	DKA-S		
Day 1 – 1 dzień	\bar{x}	20.00	19.86	0.485	0.638
	SD	0.71	0.69		
1st week – 1 tydzień	\bar{x}	47.55	39.86	1.806	2.377
	SD	1.13	3.76		
2nd week – 2 tydzień	\bar{x}	95.44	73.14	7.424	9.733
	SD	6.08	14.78		
3th week – 3 tydzień	\bar{x}	137.67	118.29	6.467	8.513
	SD	10.91	6.68		
4th week – 4 tydzień	\bar{x}	261.33	193.71	11.065	14.565
	SD	11.90	20.15		
5th week – 5 tydzień	\bar{x}	301.67	275.43	11.765	15.487
	SD	11.42	22.33		
6th week – 6 tydzień	\bar{x}	412.22	382.43	7.553	9.942
	SD	5.80	15.24		
7th week – 7 tydzień	\bar{x}	509.00	499.57	15.189	19.993
	SD	21.85	22.00		
8th week – 8 tydzień	\bar{x}	616.78	608.14	19.648	25.863
	SD	27.06	29.99		

Table 4. Body weight of the Golden pheasant (*Chrysolophus pictus*) chicks in the successive weeks of rearing, depending on the applied compound feedTabela 4. Masa ciała kurcząt bażanta złotego (*Chrysolophus pictus*) w kolejnych tygodniach odchowu, w zależności od zastosowanej mieszanki

Age of chicks Wiek kurcząt		Type of compound feed Rodzaj mieszanki		LSD _{0,05} NIR _{0,05}	LSD _{0,01} NIR _{0,01}
		IB-1, IB-2	DKA-S		
Day 1 – 1 dzień	\bar{x}	16.60	16.40	0.756	0.996
	SD	1.35	1.07		
1st week – 1 tydzień	\bar{x}	52.50	36.40	1.620	2.132
	SD	3.17	1.90		
2nd week – 2 tydzień	\bar{x}	73.80	55.90	2.516	3.313
	SD	3.94	4.17		
3th week – 3 tydzień	\bar{x}	121.20	75.60	4.688	5.775
	SD	8.93	4.53		
4th week – 4 tydzień	\bar{x}	178.70	113.00	6.527	8.592
	SD	5.33	13.90		
5th week – 5 tydzień	\bar{x}	210.00	185.10	4.990	6.569
	SD	5.62	9.90		
6th week – 6 tydzień	\bar{x}	259.60	219.30	10.819	14.241
	SD	16.64	18.23		
7th week – 7 tydzień	\bar{x}	334.10	279.60	6.065	7.983
	SD	11.50	7.69		
8th week – 8 tydzień	\bar{x}	401.40	335.90	8.607	11.330
	SD	16.20	11.10		

The Golden pheasants that received the IB concentrate throughout the rearing period were heavier than the pheasants fed with the DKA-S compound feed. After 8 weeks, their body weight amounted to 401.40 g and was 65.5 g higher than the body weight of the pheasants fed with the DKA-S concentrate.

The Common and Golden pheasant rearing results should be regarded as satisfactory. The birds attained body weights typical of their species. Znaniecka and Wajda (1977), as

well as Kokoszyński et al. (2011), identified a lower body weight of eight-week-old Common pheasants than the one determined in the present work. A different study by Znaniecka, in turn, identified a higher body weight of eight-week-old Common pheasants than the one determined by the present authors (Znaniecka 1973; Znaniecka and Sobina 1973).

The mean daily weight gains of the Common pheasant chicks between the 1st day and the 4th week of age amounted to 6.89 g and 4.97 g, depending on the type of applied feed (Table 5).

Table 5. Mean daily body weight gains of the Common (*Phasianus colchicus*) and Golden (*Chrysolophus pictus*) pheasants, depending on the rearing stage and applied feed [g]

Tabela 5. Średnie dobowe przyrosty masy ciała bażantów zwyczajnych (*Phasianus colchicus*) i bażantów złocistych (*Chrysolophus pictus*), w zależności od okresu odchowu i zastosowanej mieszanki [g]

Rearing stage Okres odchowu		Type of compound feed Rodzaj mieszanki		LSD _{0.05} NIR _{0.05}	LSD _{0.01} NIR _{0.01}
		IB-1, IB-2	DKA-S		
<i>Phasianus colchicus</i>					
Until 4th week Do 4 tygodnia	\bar{x} SD	6.89 0.32	4.97 0.56	0.305	0.401
From 5th until 8th week Od 5 do 8 tygodnia	\bar{x} SD	11.25 0.57	11.88 0.30		
From 1st day until 8th week Od 1 dnia do 8 tygodnia	\bar{x} SD	9.47 0.42	9.34 0.47	0.305	0.402
<i>Chrysolophus pictus</i>					
Until 4th week Do 4 tygodnia	\bar{x} SD	4.63 0.12	2.76 0.37	0.170	0.223
From 5th until 8th week Od 5 do 8 tygodnia	\bar{x} SD	6.83 0.41	5.38 0.10		
From 1st day until 8th week Od 1 dnia do 8 tygodnia	\bar{x} SD	6.11 0.24	5.07 0.16	0.126	0.166

Similar to the results of their own body weight gains of pheasants were also identified by Wise (1994) and Kokoszyński et al. (2012). In their study of the usefulness of compound feeds in the diet of Common pheasants, Kokoszyński et al. (2011) determined mean daily body weight gains during the period between the 1st day and the 4th week of age amounting to 4.8 g and 5.6 g. It should be noted that the mean daily body weight gains of both Common and Golden pheasants were higher in the case of the IB concentrate, as compared with the DKA-S compound feed. The effect of the applied feed was, however, noticeable mostly in the initial period of rearing – until the 4th week of age. During that period, inter-group differences in the degree of body weight gain were considerable and amounted to 1.92 g in the case of the Common pheasants ($P \leq 0.01$) and 1.87 g in the case of the Golden pheasants ($P \leq 0.01$). At a later stage in rearing, differences in the degree of pheasant body weight gain resulting from the applied feed were already smaller, though generally statistically confirmed. Between the 5th and 8th week of age, the daily body weight gains of the Common pheasants fed with the DKA-S concentrate slightly higher, and over the entire rearing period, from the 1st day until the 8th week of age, the body weight gains of the Common pheasants fed with the IB and DKA-S concentrates became almost equal. The mean daily body weight gains of the Golden pheasants fed with the IB concentrate throughout the experimental period, i.e. from Day 1 until complete 8 weeks of age were higher.

The growth rate indices of the pheasants are presented in Table 6. The data show that the birds fed with the IB and DKA-S concentrates featured a very fast rate of growth during the rearing period from the 1st day until the 4th week of age. During that period, a faster growth rate, both in the case of Common and Golden pheasants, was observed in the group of birds fed with the IB concentrate. The growth rate index fell between the 5th and 8th week of age, ranging from 57.95% to 75.45%. The fast growth rate in the first weeks of life creates a much higher demand for nutrients than later on (Rutkowski 1996). With age, protein synthesis intensity diminishes and fatty tissue depositing increases. Fat depositing in pheasants is a species-specific trait connected with preparation for wintering (Mróz 2003).

Table 6. Growth rate indices of the Common (*Phasianus colchicus*) and Golden (*Chrysolophus pictus*) pheasants, depending on the applied feed [%]

Tabela 6. Wskaźnik tempa wzrostu masy ciała bażantów zwyczajnych (*Phasianus colchicus*) i bażantów złocistych (*Chrysolophus pictus*), w zależności od zastosowanej mieszanki [%]

Rearing stage Okres odchowu		Type of compound feed Rodzaj mieszanki		LSD _{0.05} NIR _{0.05}	LSD _{0.01} NIR _{0.01}
		IB-1, IB-2	DKA-S		
<i>Phasianus colchicus</i>					
From 1st until 4th week Od 1 do 4 tygodnia	\bar{x} SD	171.55 0.56	162.60 2.53	1.187	1.563
From 5th until 8th week Od 5 do 8 tygodnia	\bar{x} SD	68.60 0.98	75.45 2.88		
<i>Chrysolophus pictus</i>					
From 1st until 4th week Od 1 do 4 tygodnia	\bar{x} SD	166.05 1.72	149.03 2.83	1.451	1.909
From 5th until 8th week Od 5 do 8 tygodnia	\bar{x} SD	62.57 1.82	57.95 2.05		

Feed consumption by the Common and Golden pheasants is presented in Table 7. The data show that the Common pheasant chicks consumed slightly less feed when administered the IB concentrate in comparison with DKA-S administration. Despite the fact, the chicks maintained on the IB concentrate attained a slightly higher body weight at the end of the eight-week rearing period (Table 3). No pronounced differences were observed in the intake of feed during the rearing period between the Golden pheasant chick groups fed with the IB and DKA-S concentrates. The feed intake determined in the present work was typical of pheasant chicks reared in aviary conditions and similar to the intake levels identified by Krystianiak and Torgowski (1998).

Table 8 contains data showing the cumulative feed consumption by the birds over the entire rearing period, feed consumption per 1 bird and feed consumption per 1kg of body weight gain. The data show that feed consumption per 1kg of body weight gain in the group of Common pheasants was lower in the case of birds fed with the IB concentrate in comparison with the DKA-S compound feed. Similar feed consumption levels per 1kg of body weight gain in pheasants were reported by Rutkowski (2001). A clearly lower feed consumption (3.50 kg per 1 kg of body weight gain) was observed in the IB-fed group of Golden pheasants than in the one fed with the DKA-S concentrate (4.20 kg / 1 kg of body weight gain). In her study of the usefulness of compound feeds in the diet of Common pheasants, Znaniecka (1976) identified a slightly higher individual consumption of the DKA-S concentrate per 1 kg of body weight gain than in the present work.

Table 7. Mean feed consumption by the Common (*Phasianus colchicus*) and Golden (*Chrysolophus pictus*) pheasants depending on the age and type of applied feed [g]Tabela 7. Średnie spożycie paszy przez bażanty zwyczajne (*Phasianus colchicus*) i bażanty złociste (*Chrysolophus pictus*), w zależności od wieku i rodzaju zastosowanej mieszanki [g]

Rearing stage Okres odchowu	Feed consumption Spożycie paszy			
	daily dziennie		total całkowite	
	IB-1, IB-2	DKA-S	IB-1, IB-2	DKA-S
<i>Phasianus colchicus</i>				
Until 28th day Do 28 dnia	15	16	420	448
From 29th until 42th day Od 29 do 42 dnia	34	34	476	476
From 43th until 56th day Od 43 do 56 dnia	44	47	616	658
<i>Chrysolophus pictus</i>				
Until 28th day Do 28 dnia	13	14	364	392
From 29th until 42th day Od 29 do 42 dnia	34	32	476	448
From 43th until 56th day Od 43 do 56 dnia	40	40	560	560

Table 8. Feed consumption by Common (*Phasianus colchicus*) and Golden (*Chrysolophus pictus*) pheasant chicks during the rearing period [kg]Tabela 8. Spożycie paszy przez kurczęta bażanta zwyczajnego (*Phasianus colchicus*) i bażanta złocistego (*Chrysolophus pictus*) w okresie odchowu [kg]

Detailed data Wyszczególnienie	<i>Phasianus colchicus</i>		<i>Chrysolophus pictus</i>	
	IB-1, IB-2	DKA-S	IB-1, IB-2	DKA-S
Overall feed consumption in the group Łączne spożycie paszy w grupie	14.00	11.00	14.00	14.00
Feed consumption per 1 bird Spożycie paszy na jednego ptaka	1.55	1.60	1.40	1.40
Feed consumption per 1 kg of body weight gain Spożycie paszy na 1 kg przyrostu masy ciała	2.51	2.60	3.50	4.20

CONCLUSION

The Golden pheasants fed with IB throughout the rearing period were heavier than those maintained on DKA-S. The mean daily body weight gains of the Common and Golden pheasants were higher in the case of the IB concentrate. Summing up the study results, it must be stated that broiler chick and trukey compound feeds can be effectively used for rearing pheasants. The use of the IB concentrate for rearing pheasants provides better results than a DKA-S diet in the case of both Common and Golden pheasant chicks.

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Abstract. The study was aimed at analysing the possibility of using concentrate mixes produced for broiler DKA-S and turkey chicks IB-1, IB-2 for rearing the Common and Golden Pheasant. Diet analyses were conducted on 40 birds, including 20 Common and 20 Golden pheasants. The Common and Golden pheasants in both diet groups did not significantly differ in body weight. During the rearing period, the mean body weight of the Common pheasants fed with the IB concentrate was higher than the body weight of those fed with the DKA-S concentrate. After 4 weeks, the difference in the mean body weight already reached more than 67 g. After 8 weeks, the pheasants in both diet groups were similar in body weight, amounting to 616.78 g in the case of those fed with the IB concentrate and 608.14 g in the case of the birds receiving the DKA-S concentrate. The Golden pheasants fed with IB throughout the rearing period were heavier than those maintained on DKA-S. After 8 weeks, they reached the body weight of 401.40 g, i.e. they were 65.5 g heavier than the pheasants fed with DKA-S. The mean daily body weight gains of the Common and Golden pheasants were higher in the case of the IB concentrate. The birds fed both with IB and DKA-S featured a very fast growth rate between the 1st day and the 4th week of age. Between the 5th and 8th week the growth rate decelerated, ranging from 57.95% to 75.45%. Compound mixes destined for broiler chicks and turkeys can be effectively used for rearing pheasants. In comparison with DKA-S, the IB concentrate provides better results in rearing both Common and Golden pheasants.

