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ANSInet
308 Lasani Town, Sargodha Road, Faisalabad - Pakistan
Mob: +92 300 3008585, Fax: +92 41 8815544
E-mail: editorijps@gmail.com

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Metabolism Energy and Viscosity in Response to Cold and Tropical Cereals Area in Leghorn Pullets

A.A. Saki
Department of Animal Science, Bu-Ali Sina University, Hamadan, Islamic Republic of Iran

Abstract: Environmental aspects could influence metabolism energy and viscosity of cereal in poultry nutrition. Four cereals seeds includes Alvand wheat, Makoie barley (as a cold cereals area), Chamran wheat and Karoun barely (as a tropical cereals area) in Iran were tested for measuring metabolize energy and viscosity. First experiment was arranged by 25 mature rooster using Sibbled methods to examine the metabolize energy. In the second experiment different percentage of cereals in 9 treatments (20 and 40% of Alvand and Makoie wheat and barley respectively) and (20 and 40% Chamran and Karoun, wheat and barley respectively) were used with control diets. The digesta of small intestine viscosity was recorded in the end of this experiment. No significant differences ($P>0.05$) was observed in gross energy (GE). Apparent metabolism energy (AME), apparent metabolism energy corrected by nitrogen (AMEn) True metabolism energy (TME) and TMEn were significantly higher in wheat than both types of barley. Significant increased ($P<0.05$) was found in this reflection in AME of Alvand and chamran wheat than both type of barley. In contrast, similar reaction was shown in AMEn, TME and TMEn of Chamran wheat compared with Karoun barley. The lowest significant value ($P<0.05$) was found in Makoie barley in this respect. There were no significant differences ($P<0.05$) between feed intake (FI) and feed conversation ratio (FCR) for all treatments. Corresponding with high level of fiber in karoun and Makoie barley, significantly higher ($P<0.05$) viscosity was observed in karoun barley than other seed. The result of this study has shown that there was a significantly lower ($P<0.05$) metabolism energy in Makoie barley as a cold cereal area as well as higher viscosity compared with other examined cereals. This was corresponding with high significant ($P<0.05$) viscosity and high fiber content of cereal.

Key words: Metabolize energy, viscosity, cold and tropic cereals, leghorn pullets

Introduction

Energy is one of the major factors which can play the vital role in the feed intake and consequently in feed formulation in poultry industry (Hunton, 1995). Balancing formulation ration without energy could not be possible, since nutrients intake can be influenced by different levels of energy in diet. Therefore deficiency of nutrients may be occur in poultry by more increasing of energy content in diet. In contrast feed intake as well as nutrient utilization are increased by low level of energy in diet (Nesheim and Austic, 1990; Hunton, 1995). In the economic aspect of energy, bioavailable energy (BE) accounts for approximately 40% of the cost in poultry production. McNab and Boorman, 2002, showed that chicken attempt to eat satisfy their energy requirements but are unsuccessful at low dietary BE concentration. On the other hand, physical status, unpalatable of feed and environmental condition could effect of feed intake and as well as energy bioavaliabity (Scott *et al*., 1998). In different environmental condition could give the useful information and knowledge for feed formulation in poultry industry. The bioassay of metabolism energy has been established by Sibbald, 1982; Code and Haresing, 1989, for measuring of AME, AMEn, TME and TMEn. In addition lack information to describing the metabolizable energy value is appeared due to different environmental aspects particularly in our country condition. It is thought that not only environment response, but inhibiting in digestion and absorption of nutrients were observed by cereal viscosity in broilers (Wad, 1996). These reflections could be couple with high viscosity in intestinal content of pullets. Therefore it needs to be tested in early age in pullets. Since this study was conduct to examine the metabolism energy and viscosity of different cereal area in Leghorn pullets in Iran.

Materials and Methods

Twenty five roosters (broiler Arian) at 15 months of age were used in the individual cage for measuring metabolism energy. Oeaster shell has been removed from the rooster diet at least one week before experiment to make a sure the gastrointestinal tract is clean from stone, sandy and solid materials. Sibbaled method (force feeding) was employed to determine the metabolism energy, 24 hours fasting using water and 40 g of each diet includes (Alvand wheat, Makouie Barley as a cold area cereal) and (Chamran Wheat and karoun Barley as a tropical cereal) that were used with four treatments and five birds for each. Control group (5 birds) without any feed was also placed in individual cage. After 48 hours fecal samples were collected and dried in 45°C in 36 hours (Sibbald, 1976, 1978). Gross

Table 1: Chemical composition of cold and tropical cereal area

Feed	GE	P	Ca	CF	EE	CP	DM
Alvand W.	4228.8	0.90	0.11	2.84	1.90	12.81	91.26
Chamran W.	4209.6	0.40	0.12	2.87	2.02	14.50	92.44
Makoie B.	4158.9	0.35	0.14	6.88	2.92	12.23	91.41
Karoun B.	4128.9	0.40	0.15	7.52	2.37	11.00	91.23

W, Wheat; B, barley; DM, Dry Matter; CP, Crude Protein; CF, Crude Fiber; Ca, calcium; P, Phosphorous; GE, Gross Energy

Table 2: Metabolism energy of cold and tropical area cereal

Feed	GE	AME	AMEn	TME	TMEn
Alvand W.	4228.80^{a}	2861.88^{a}	2856.13^{a}	2945.95^{a}	2940.19^{a}
Chamran W.	4209.60^{a}	2777.99^{a}	2771.78^{ab}	2865.31^{ab}	2859.70^{ab}
Makoie B.	4158.90^{a}	2265.48^{c}	2259.84^{c}	2351.94^{c}	2346.30^{c}
Karoun B.	4128.90^{a}	2539.49^{b}	2534.98^{b}	2630.83^{b}	2626.33^{b}

Means in same column with differ superscription are significantly different ($p<0.05$)

Table 3: Body weight and feed efficiency of Leghorn pullets in response to cold and tropical cereal area

Treatments	BW/g	BG/g	FI/kg	FCR
20% Al.. W.	1416	228	19.93	3.07
40% Ch. W.	1379	157	19.57	3.68
20% Ma. B.	1430	178	20.82	3.34
20% Ch. W.	1400	180	21.69	4.62
40% Ma. B.	1383	214	19.20	3.32
40% Ka. B.	1379	186	20.94	4.68
40% Al. W.	1364	227	19.79	3.02
20% Ka. B.	1400	259	20.54	4.36
Control Diet	1429	190	20.94	3.84

BW/g, body weight in gram; BG, body gain; FI, feed intake/kg; FCR, feed conversion ratio. Mean in the same column without any superscription are no significantly different (P< 05). Al, Alvand; W, Wheat; Ch, Chmran; Ma., Makoie; B, Barley; Ka., Karoun.

energy of feed and fecal samples were measured in Bombcalorimeter (Model 1261, PARR). In the second experiment 180 Leghorn pullets were placed in the cages (5 birds per cage) with their diet in 9 treatments were arranged based on recommend for W36 high line in leghorn. After 15 week rearing not only egg production but the digesta from small intestine of four hens in each treatment were collected to examine the viscosity of cereal diet. Viscosity was measured by using Stowald methods (Habibi, 1999). Formulation ration was designed by NRC (1994) recommended and W36 high Line manual (Kosar Economic Organization. Sadighi, 2000). In chemical analysis, AOAC (1990) methods were employed.

Results

In the chemical analysis as presented in the Table 1. There are the similarly range in dry matter (DM), crude protein (CP), eter extra (EE), calcium (Ca), phosphorous (P) and gross energy (GE) in the both cereal area. In contrast of high level of crude fiber (CF) which appeared in Makoie and Karoun barley.

No significant differences were shown in body weight (BW), body gain (BG), feed intake (FI) and feed conversion ratio (FCR) regarding with different cereal area in all treatments (Table 3).

As a presented in the Table 2. no changes has been apparent in gross energy in cold and tropical cereal area. AME , AMEn, TME and TMEn in Alvand wheat were significantly higher ($P<0.05$) than both types of barley. The similar reaction was observed in all reflections of Chamran wheat and Karoun barley. Alvand wheat was the highest and Makoie barley was significantly ($P<0.05$) lowest in metabolism energy between investigated cereals. High significant viscosity ($P<0.05$) was shown in 40% of karoun barley in comparison with other cereals in this study (Fig. 1).

Discussion

Chemical composition, energy level, and viscosity content of pullets diet may influence feed efficiency and consequently in the egg production. Since the feed efficiency is the major factor which could effect in healthy condition, growing rate and optimum egg production. As elucidated in Table 1 most nutrients as well as gross energy are in the similar trend in tested cereal in exception of barley with high fiber in this trail. These finding were corresponding with NRC results in 1994. Body weight, body gain, feed intake and feed conversion ratio were the similarity in recorded cereal in Leghorn pullets these approaches were not supported by other researchers. The reason of such achievement could be couple with experimental condition and cereal cultivars that may be differ in different area of the world. AME, AMEn, TME and TMEn were significantly higher ($P<0.05$) in the both types of wheat than Makoie barley (as a cold cereal area). This may relate to high level of fiber content in barley which can reduced the bioavailability of energy content of this seed, particularly in cold region with huge amount of B-glougan in the barley (Fuente *et al*., 1998). The lowest energy content has been found in

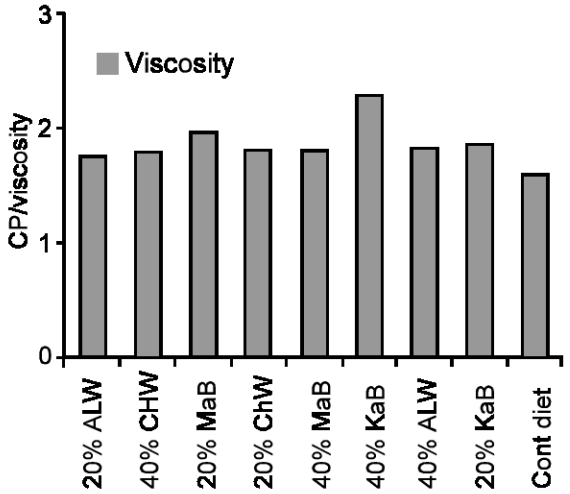

Fig 1: Different level of viscosity in the cold and tropical cereal area

the Makoie barley in contrast the highest energy level which was observed in Alvand wheat (as a cold cereal area). The same reflection was apparent regarding energy content in Karoun barley and Chamran wheat because these both cereals were growing in the similar region of environmental condition (as a tropical cereal area in the same place) although such a reaction was not indicated in the cold cereal area. This might be due to the original of cold cereal area which was in the different place in the contrast of the same original of tropical cereal area. The high viscosity of Karoun barley was shown compared with other cereal, this may be concern to the high content of fiber in this type of barley with low energy content in this respect β-glocan in barley cold has the more negative effect in this pattern (Yu *et al*., 1997). There is a linear relationship between energy voided as excreta and feed intake (Sibbald, 1976; Sibbald and Morse, 1982). TME and TMEn values for wheat and barley tested were higher than the AME and AMEn values these finding have been noted by Yalcin and Onol, (1994) and also supported by Askbrant (1988).

Conclusion: This study has been concluded to determination chemical composition with positive correlation by energy content were recognition in both wheat compared with barley regardless to environmental condition. High viscosity character was found in Makoie barley due to the tropical condition, high fiber content, β-glougan component as well as non-starch poly saccharides (NSPs) composition in the barley may lead to such response. It needs to be further clarified by different cultivars of cereal as well as strain potential.

References

AOAC, 1990. Official methods of analysis. 15th ed. Association of Analytical Chemists, Arlington, VA.

Askbrant, S., 1988. Metabolizable energy content of rapeseed meal, soybean meal and white-flowered peas determined with laying hens and adult cockerels. Br. Poult. Sci., 29: 445-455.

Code, D.J.A. and W. Haresign, 1989. Recent developments in poultry nutrition.

Fuente, J., P. Perez De Ayala and M.J. Villamide, 1998. Effect of storage time and dietary enzyme on the metabolizable energy and digesta viscosity of barley-based diets for poultry. Poult. Sci., 77: 90-97.

Habibi, Z., 1999. Practical methods of chemistry lab. Publishing in sohrab, PP: 403-407.

Hunton, H., 1995. Poultry production, Onario, Canada, pp: 53-118.

McNab, J.M. and K.N. Boorman, 2002. Poultry feedstuffs, supply, composition and nutritive value. Poultry science symposium Series, 26: 190-217.

National Research Council, 1994. Nutrient requirements of poultry. Ninth review edition, PP: 1-40.

Nesheim, M.C. and R.E. Austic, 1990. Poultry production, 13th Edition, pp: 197-228, 3-53.

Sadighi, N., 2000. Manual of white leghorn high line W36, Center of educational of research in economic organization agricultural, PP: 40.

Scott, T.A., F.G. Silver sides, H.L. Classen, M.L. Swift and M.R. Bedford, 1998. Effect of cultivar and environment on the feeding value of western Canadian wheat and barley samples with and without enzyme supplementation. Can. J. Anim. Sci., 649-656.

Sibbald, I.R., 1976. Abioassay for true metabolizable energy in feeding stuffs. Poult. Sci., 55: 303-308.

Sibbald, I.R., 1982. Measurement of bioavailable energy in poultry feeding stuffs a review. Can. J. Anim. Sci., 62: 983-1048.

Sibbald, I.R. and P.M. Morse, 1982. The effect of input and excreta collection time on estimates of metabolic plus endogenous energy losses in the bioassay for true metabolizable energy. Poult. Sci., 62: 68-76.

Sibbald, I.R., 1978. The effect of the duration of the time interval between assay on true metabolizable energy values measured with adult roosters. Poult. Sci., 55: 455-460.

Ward, N.E., 1996. Intestinal viscosity, broiler performance. Poult. Dig., 55: 12-16.

Yalcin, S. and A.G. Onol, 1994. True metabolizable energy values of some feeding stuffs. Br. Poult. Sci., 35: 119-122.

Yu, B., J.C. Hsu and P.W.S. Chiou, 1997. Effect of B-glucanase supplementation of barley diets on growth performance of broiler. Anim. Feed Tec., 70: 353-361.