



Research Article

EFFECT OF MAIZE AND RICE BASED HEAT TREATED AND UNTREATED DIETS ON MAJOR BIOCHEMICAL ANALYTES OF WEANED LARGE WHITE YORKSHIRE PIGS

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Abstract: The manuscript described the effect of maize and rice based heat treated and untreated diets on major biochemical analytes of weaned Large White Yorkshire pigs. For the investigation, 90 pigs weaned at 28 days of age were selected and categorised into five equal groups (T₁, T₂, T₃, T₄ and C). Each group was further subdivided into three sub groups of 6 pigs each and was reared together in one pen till 56 days of age. Weaned pigs were fed to their appetite with starter (week 5 to 6) and grower I (week 7 to 8) rations (T₁- Rice based heat treated with additives, T₂- Rice based heat untreated treated with additives, T₃- Maize based heat treated with additives, T₄- Maize based heat untreated with additives, C- Maize based heat untreated without additives). The level of as glucose, total protein, albumin, aspartate aminotransferase (AST), alanine aminotransferase (ALT) and blood urea nitrogen (BUN) were estimated, which were found to be different non significantly on day 28 and 56 post weaning as well as between treatment and control groups. Data generated out of the investigation will be helpful to clinician as reference values for monitoring health of pigs.

Keywords: Pig, Weaning, Plasma, Biochemical Analytes

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Introduction

Growth and survivability of young pigs during post-weaning period is very crucial for any pig farm. Feeding of young pig is one of the important factors affecting growth and survivability of young pigs [1, 2]. Maize is the main source of cereal used as source of energy in pig feed formulations all over the world. Due to low fibre content of rice, replacement of maize with rice for young piglet's diet is found to be very beneficial [3] in terms of growth and health indices. However, diets and its method of treatments affect energy and nutrient content as well as its bodily utilization [4] and thus it influences health and productivity [5]. Therefore, it is imperative to monitor the health of the pigs during supplementation of different dietary formulations to avoid mortality. Blood biochemical parameters are routinely used to assess the health of farm animals since any alteration due to metabolic changes may give rise to a change in the blood biochemical profile [6]. Till date, no studies can be traced to see the effect of feeding rice and maize on health of pigs although these two constitute a major part of pig's dietary formulations. It is univocal that heat processing of ingredients increases palatability and destroys toxins and germs present in feed and thereby improve health reducing the incidence of diseases. In view of the above, the present study was planned to compare the health status of young pigs in terms of biochemical analytes during post weaning period, which were fed rice or maize based heat treated or untreated diets.

Materials and method

For the investigation, 90 numbers of Large White Yorkshire pigs, weaned at 28 days of age were randomly selected from the pig units created under DBT funded project in Department of Livestock Production and Management as well as pig units of Instructional Livestock Farm Complex, College of Veterinary Sciences & A.H. The selected pigs were equally divided into five groups (T₁, T₂, T₃, T₄ and C) with 18 pigs per group. Each group was further subdivided into three sub groups with 6 pigs per group and was reared together in one pen till 56 days of age. The pigs were fed to their appetite with starter (week 5 to 6) and grower I (week 7 to 8) rations (T₁- Rice based heat treated with additives, T₂- Rice based heat untreated treated with additives, T₃- Maize based heat treated with additives, T₄- Maize based heat untreated with additives, C- Maize based heat untreated without additives). Rations under heat treatment were cooked with normal pressure cooker with addition of water. Upon cooling, mineral mixture and feed additives were added as per ration formulation just before feeding to piglets. Blood samples were collected in vacutainers with anticoagulants from the anterior vena cava by using 5 ml disposable syringes from all pigs under study on day 28 and 56 of the experimental period. Collected blood samples were subjected to centrifugation at 3,000 rpm for 15 mins to separate out the plasma. Blood-biochemical parameters viz. glucose, total protein, albumin, alanine aminotransferase (ALT), aspartate aminotransferase (AST) and blood urea nitrogen (BUN) were estimated using ready to use commercial kit (Crest Biosystems).

Table-1 The mean \pm SE of haemato-biochemical parameters of weaned pigs from at day 28 and 56 post weaning under treatment and control groups

Parameters	Age (day)	T ₁	T ₂	T ₃	T ₄	C	F value	P value
Glucose (mg/dl)	28	116.67 \pm 10.35	139.33 \pm 11.46	116.33 \pm 5.55	105.33 \pm 2.40	110.33 \pm 4.81	2.84	0.08
	56	104.73 \pm 5.95	106.03 \pm 6.08	108.10 \pm 3.97	97.67 \pm 1.89	109.27 \pm 2.22	1.07	0.42
Total protein(g/dl)	28	5.47 \pm 0.03	5.13 \pm 0.26	6.07 \pm 0.65	5.40 \pm 0.10	4.50 \pm 0.29	2.77	0.09
	56	4.37 \pm 0.67	3.86 \pm 0.98	5.96 \pm 0.18	5.52 \pm 0.72	4.78 \pm 0.14	1.83	0.20
Albumin(g/dl)	28	3.63 \pm 0.22	3.43 \pm 0.35	3.37 \pm 0.18	3.43 \pm 0.03	2.70 \pm 0.30	2.17	0.15
	56	2.89 \pm 0.41	2.60 \pm 0.55	3.70 \pm 0.40	3.79 \pm 0.21	2.90 \pm 0.47	1.58	0.25
AST(IU/l)	28	32.67 \pm 3.38	29.33 \pm 5.04	24.67 \pm 1.45	32.00 \pm 0.58	24.67 \pm 0.33	1.89	0.19
	56	41.07 \pm 4.68	36.60 \pm 7.59	33.20 \pm 5.49	41.30 \pm 8.50	43.90 \pm 11.76	0.28	0.88
ALT(IU/l)	28	34.33 \pm 1.76	39.00 \pm 2.08	37.00 \pm 1.53	32.67 \pm 2.33	37.33 \pm 1.45	1.85	0.20
	56	27.87 \pm 4.76	31.03 \pm 6.75	34.63 \pm 5.49	24.80 \pm 1.55	29.63 \pm 6.46	0.47	0.76
BUN(mg/dl)	28	7.60 \pm 0.67	7.07 \pm 1.14	13.20 \pm 4.70	13.10 \pm 1.76	10.40 \pm 1.90	1.39	0.31
	56	10.51 \pm 0.79	10.77 \pm 0.62	12.70 \pm 0.35	10.43 \pm 0.47	10.80 \pm 0.89	2.07	0.16

*. Significant ($p < 0.05$), **.Highly significant ($p < 0.01$)

Results were analysed statistically as per the methods described by Snedecor and Cochran [7].

Results and discussion

The mean \pm SE of haemato-biochemical parameters of weaned pigs on day 28 and 56 post weaning under treatment and control groups are presented in table-1. The blood glucose levels in pigs on day 28 and 56 post-weaning were ranged from 97.67 \pm 1.89 to 139.33 \pm 11.46 mg/dl in treatment groups and 109.27 \pm 2.22 to 110.33 \pm 4.81 mg/dl in control group. However, the differences observed were not significant between the treatment and control group. The recorded glucose levels were within the range reported in earlier studies [8,9]. The differences observed in blood glucose levels of pigs during different periods after weaning within the treatment groups were also non-significant. Our findings are in accordance with the report of Mayengbam, *et al.* [10]. Total protein levels in pigs on day 28 and 56 post-weaning were within the range 3.86 \pm 0.98 to 6.07 \pm 0.65 g/dl and from 4.50 \pm 0.29 to 4.78 \pm 0.14 g/dl in treatment and control groups respectively. Similar type of range was also reported by Copper *et al.* [9]. Nonetheless, the differences in protein level amongst the experimental groups were non-significant. The serum albumin level in pigs on day 28 and 56 post-weaning were found to be within the range from 2.60 \pm 0.55 to 3.79 \pm 0.21 g/dl and from 2.70 \pm 0.30 to 2.90 \pm 0.47 g/dl in treatment and control groups, respectively. Similar range of serum albumin was reported by Kumar *et al.* [8]. Statistical analysis revealed non-significant differences in albumin levels in weaned pigs between the treatment and control groups. The AST levels in pigs on day 28 and 56 post-weaning were found to be within the range from 24.67 \pm 1.45 to 41.30 \pm 8.50 IU/l and from 24.67 \pm 0.33 to 43.90 \pm 11.76 IU/l in treatment and control groups respectively. The differences in AST levels in weaned pigs between and within the treatment and control groups were not significant. The present finding indicated that housing system did not influence the AST activity in pigs. The AST activity of pig during different periods did not show any significant change. The present finding was in agreement with the reports of Carr [11]. Similarly, the ALT levels of different groups were also non-significant, which corroborate the report of Sarma, *et al.* [12]. However, the ALT levels in pigs on day 28 and 56 post-weaning were found to within the range from 24.80 \pm 1.55 to 39.00 \pm 2.08 IU/l and from 29.63 \pm 6.46 to 37.33 \pm 1.45 IU/l under treatment and control groups respectively. Similar range of ALT was reported by Kaneko *et al.* [9, 13]. The mean \pm S.E for BUN levels in pigs on day 28 and 56 post-weaning were found to be within the range from 7.07 \pm 1.14 to 13.20 \pm 4.70 mg/dl and from 10.40 \pm 1.90 to 10.80 \pm 0.89 under treatment and control groups respectively. Similar range was reported by Prasad and Kumar [14]. The BUN activity of pig during different periods did not show any significant change. The present finding was in agreement with the reports of Carr [11,12]. It may be noted that non-significant variation of the biochemical analyse between the control and treatment groups is not surprising because, since most of these parameters are under the homeostatic control systems [15].

Conclusion

It may be concluded that maize and rice based heat treated and untreated diets does not play significant role in alteration of haemato-biochemical profile of Large White Yorkshire pigs during post weaning period.

Application of Research: Data generated during the current study may be useful as reference values for the scientific community for future investigation. Further, these data may aid in monitoring the health status of pigs.

Research Category: Veterinary Sciences

Abbreviations

FCR : Food conversion ratio
 mg/L : Miligram per liter
et al. : et alii
 g/dl : Gram per decilitre
 IU/l : International Unit per liter

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