



EFFECT OF GERMINATED MAIZE AND SORGHUM BASED DIET AT DIFFERENT LEVELS ON HAEMATOLOGICAL PARAMETERS IN KADAKNATH

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ABSTRACT

Poultry keeping is practiced by majority of the poor and marginalized rural households all over India. These households rely on low cost backyard poultry rearing to supplement and enhance their livelihoods. Kadaknath is an important indigenous breed of poultry inhabitation in vast areas of Western Madhya Pradesh mainly the Jhabua and Dhar districts and adjoining areas of Gujarat and Rajasthan. The nutritive value of maize and sorghum seed depends on the technological processes used, such as milling, oil extraction, starch separation and germination. The present experiment was conducted on 240 day old Kadaknath chicks belonging to same hatch and randomly divided into six treatment groups of 40 chicks each *viz.*, GM0, GM1, GM2, GS0, GS1 and GS2. Control groups (GM0) and (GS0) were given standard ration with 100% normal maize and 100% normal sorghum based diet respectively. The treatment Group GM1 and GM2 was given diet containing standard ration with 50% germinated maize and 75% germinated maize respectively. Group GS1 and GS2 were given diet containing standard ration with 50% germinated sorghum and 75% germinated sorghum respectively. There were significant increase in the haemoglobin, total erythrocytes, total leucocytes, packed cell volume, MCV, MCH and MCHC in all supplemented groups as compared to control group.

KEYWORDS: Germination, Sorghum, Maize, Kadaknath, haematological.

INTRODUCTION

Poultry keeping is practiced by majority of the poor and marginalized rural households all over India. These households rely on low cost backyard poultry rearing to supplement and enhance their livelihoods. It not only provides nutritional security but also reduces the livelihood vulnerability, and promotes gender equality. Kadaknath is an important indigenous breed of poultry inhabiting vast areas of Western Madhya Pradesh mainly the Jhabua and Dhar districts and adjoining areas of Gujarat and Rajasthan. Though the flesh of this breed is black, it is considered not only a delicacy of distinctive taste, but also of medicinal value. Sorghum is the fifth most important crop after wheat, rice, corn, and barley (Bryden *et al.*, 2009). Maize is one of the main cereals used in feeding broiler chickens worldwide. It is free of viscous non-starch polysaccharides, the major anti-nutritive factor present in most other cereals like barley, wheat, and oats. At present the feed industry is using maize as a basic energy source in poultry diets. The total calorific value and nutritional composition of maize and sorghum are similar. Nutritional value of germinated grain improves due to the conversion of complex compounds into simpler and assimilable form and by minimizing the effect of anti-nutritional factors during germination (Chavan and Kadam, 1989). Sprouting of grains can be used advantageously as it has resulted not only in increase protein quantity but quality also.

MATERIALS & METHODS

The present experiment was conducted on 240 day old Kadaknath chicks belonging to same hatch and randomly

divided into six treatment groups of 40 chicks each *viz.*, GM0, GM1, GM2, GS0, GS1 and GS2. Each group was further divided into four replications of 10 birds each. The duration of the experiment was carried out for 90 days. Control groups (GM0) and (GS0) were given standard ration with 100% normal maize and 100% normal sorghum based diet respectively. The treatment Group GM1 was given diet containing standard ration with 50% germinated maize. The Group GM2 was given diet containing standard ration with 75% germinated maize. Group GS1 was given diet containing standard ration with 50% germinated sorghum. Group GS2 was given diet containing standard ration with 75% germinated sorghum. The experimental birds were vaccinated against Ranikhet disease and Gumboro disease/IBD at appropriate time.

The birds were housed in deep litter system in the well ventilated and lighted rooms and the feed was given *ad.lib.* with plenty of fresh water. The body weight of day old chicks was recorded on arrival and thereafter on weekly intervals. Blood was collected on every 30th days from each bird. About 3-4ml was collected from wing vein using 22-24 gauge needle in a clean dry vial containing 2.0 mg/ml Ethylene diamine tetra acetic acid, Sodium salt (EDTA) as an anticoagulant for haematological analysis. All observations were analyzed by using ANOVA to compare different treatment group.

RESULTS

(1) Haemoglobin (Hb) (gm/dl)

The mean values of Haemoglobin concentration of GM0, GM1, GM2, GS0, GS1 and GS2 were 7.65±0.11, 8.10±0.12, 8.52±0.12, 7.02±0.06, 8.17±0.11 and 8.07±0.08,

after 30 days of study, 7.95±0.06, 8.15±0.08, 8.10±0.06, 7.97±0.04, 8.15±0.06 and 8.22±0.04, after 60 days and 8.05±0.06, 8.25±0.04, 8.58±0.06, 8.12±0.04, 8.25±0.06 and 8.35±0.04 respectively, after 90 days of study. There was a significant change in haemoglobin concentration in treated groups as compared to control group.

(2) Packed cell volume (PCV %)

The mean values of PCV for groups GM0, GM1, GM2, GS0, GS1 and GS2 were 27.50±0.64, 29.75±0.47, 30.50±1.32, 30.25±1.03, 31.75±1.03 and 30.75±0.62, 28.75±0.47, 30.00±0.40, 32.25±0.85, 31.00±0.40, 31.75±0.64 and 31.90±0.47, and 28.75±0.47, 31.75±0.47, 33725±0.25, 30.50±0.28, 31.95±0.47 and 31.95±0.04, respectively for 30, 60 and 90 days of study. There was a significant change in PCV in treated groups as compared to control group.

(3) Total erythrocyte count (TEC) (million/cu.mm)

The mean values of total erythrocyte count for 1st month of GM0, GM1, GM2, GS0, GS1 and GS2 were 3.58±0.08, 3.89±0.04, 3.89±0.02, 3.26±0.01, 3.41±0.01 and 3.33±0.01, for 2nd month, were 3.65±0.02, 3.90±0.01, 3.92±0.01, 3.34±0.01, 3.95±0.01 and 3.90±0.01, and for the 3rd month the values were 3.66±0.01, 3.93±0.01, 3.95±0.04, 3.36±0.01, 4.09±0.02 and 3.89±0.02 respectively. There was a significant change in TEC in all treated groups as compared to control group except in GS0, GS1 and GS2 groups in 30 days after treatment.

(4) Total leucocytes count (TLC) (thousand/cu.mm)

The mean values of total Leucocytes count for groups GM0, GM1, GM2, GS0, GS1 and GS2 were 24.00±0.40, 24.50±0.64, 24.25±0.47, 21.00±0.40, 23.00±0.40 and 22.75 ±0.25, 22.25±0.47, 24.75±0.47, 25.20 ±0.47, 22.25 ±0.47, 25.00 ±0.40 and 23.75 ±0.47, and 22.25 ±0.47, 25.00±0.70, 25.75±0.40, 23.00±0.40, 26.00±0.40 and 24.50 ±0.64, respectively, for 30, 60 and 90 days of study

period. There was a significant change in TLC in all treated groups as compared to control group except in GM0, GM1 and GM2 groups after 30 days of treatment.

(5) Mean corpuscular volume (MCV) (fl)

The mean values of MCV for groups GM0, GM1, GM2, GS0, GS1 and GS2 were 76.81±0.49, 76.47±0.17, 78.40±0.19, 92.79±0.25, 93.10±0.22 and 92.34±0.10, 78.76±0.20, 76.92±0.13, 82.27±0.21, 92.81±1.00, 80.37±0.09 and 81.79±0.12, and 78.75±0.26, 88.42±0.16, 85.44±0.10, 90.77±0.12, 78.11±0.11 and 82.13±0.20, respectively for 30, 60 and 90 days of study. There was significant change in MCV in treated groups as compared to control group.

(6) Mean corpuscular haemoglobin (MCH) (pg)

The mean values of MCV for the groups GM0, GM1, GM2, GS0, GS1 and GS2 were 21.36±0.22, 20.82±0.18, 21.90±0.06, 21.53±0.12, 23.95±0.17, 24.23±0.07 after 30 days and 21.78±0.10, 20.89±0.03, 22.66±0.20, 23.86±0.15, 20.63±0.09, and 21.07±0.12 for 60 days, and for 90 days the values were 21.99±0.12, 20.99±0.14, 21.72±0.13, 24.16±0.15, 20.17±0.07 and 21.46±0.18, respectively. There was significant change in MCH in treated groups as compared to control group.

(7) Mean corpuscular haemoglobin concentration (MCHC) (g/dl)

The mean values of MCV for GM0, GM1, GM2, GS0, GS1 and GS2 were 27.81±0.16, 27.22±0.09, 27.93±0.08, 23.20±0.26, 25.73±0.08 and 26.24±0.14, after 30 days, 27.65±0.08, 27.16±0.37, 25.11±0.18, 25.70±0.12, 25.66±0.12 and 25.76±0.22, after 60 days and 28.00±0.14, 25.98±0.15, 25.42±0.14, 26.62±0.14, 25.82±0.16 and 26.13±0.30, respectively, after 90 days of study. There was a significant change in MCHC in all treated groups as compared to control group except in GS0, GS1 and GS2 groups in 60 days after treatment.

TABLE 1: Effect of germinated maize on haematological parameters in Kadaknath after 30, 60 and 90 days of study (Mean ± SE)

Parameters	GM0	GM1	GM2		GM0	GM1	GM2		GM0	GM1	GM2	
	(control)				(control)				(control)			
	30 Days				60 Days				90 Days			
Hb (g/dl)	7.65 ^a	8.10 ^{ab}	8.52 ^b	*	7.95 ^a	8.15 ^b	8.10 ^c	**	8.05 ^a	8.25 ^b	8.58 ^c	**
PCV (%)	±0.11	±0.12	±0.12		±0.06	±0.08	±0.06		±0.06	±0.04	±0.06	
TEC (million/mm ³)	27.50 ^a	29.75 ^b	30.50 ^c	**	28.75 ^a	30.00 ^b	32.25 ^c	**	28.75 ^a	31.75 ^b	33.75 ^c	**
TLC (thousand/mm ³)	±0.64	±0.47	±1.32		±0.47	±0.40	±0.85		±0.47	±0.47	±0.25	
MCV (femtoliter)	3.58 ^a	3.89 ^b	3.89 ^b	**	3.65 ^a	3.90 ^b	3.92 ^b	*	3.66 ^a	3.93 ^b	3.95 ^b	*
MCH (picogram)	±0.08	±0.04	±0.02		±0.02	±0.01	±0.01		±0.01	±0.01	±0.04	
MCHC (g/dl)	24.00	24.50	24.25	NS	22.25 ^a	24.75 ^b	25.20 ^b	**	22.25 ^a	25.00 ^b	25.75 ^b	**
	±0.40	±0.64	±0.47		±0.47	±0.47	±0.47		±0.47	±0.70	±0.40	
	76.81 ^a	76.47 ^a	78.40 ^b	**	78.76 ^a	76.92 ^a	82.27 ^b	**	78.75 ^a	88.42 ^c	85.44 ^b	**
	±0.49	±0.17	±0.19		±0.20	±0.13	±0.21		±0.26	±0.16	±0.10	
	21.36 ^a	20.82 ^b	21.90 ^c	**	21.78 ^a	20.89 ^b	22.66 ^c	**	21.99 ^a	20.99 ^b	21.72 ^a	**
	±0.22	±0.18	±0.06		±0.10	±0.03	±0.20		±0.12	±0.14	±0.13	
	27.81 ^a	27.22 ^b	27.93 ^a	**	27.65 ^a	27.16 ^a	25.11 ^b	**	28.00 ^a	25.98 ^b	25.42 ^c	**
	±0.16	±0.09	±0.08		±0.08	±0.37	±0.18		±0.14	±0.15	±0.14	

**Shows Significance at 1% level as compared to control group (P < 0.01)

*Shows Significance at 5% level as compared to control group (P < 0.05)

The value with the different superscripts in a row is different significantly between groups

The values with the no superscripts in a row are having no significant relationship.

TABLE 2: Effect of germinated sorghum on haematological parameters in Kadaknath after 30, 60 and 90 days of study (Mean \pm SE)

Parameters	30 Days				60 Days				90 Days			
	GS0 (control)	GS1	GS2		GS0 (control)	GS1	GS2		GS0 (control)	GS1	GS2	
Hb (g/dl)	7.02 ^a ± 0.06	8.17 ^b ± 0.11	8.07 ^b ± 0.08	**	7.97 ^a ± 0.04	8.15 ^b ± 0.06	8.22 ^c ± 0.04	**	8.12 ^a ± 0.04	8.25 ^b ± 0.06	8.35 ^c ± 0.04	**
PCV (%)	30.25 ^a ± 1.03	31.75 ^c ± 1.03	30.75 ^b ± 0.62	**	31.00 ^a ± 0.40	31.75 ^b ± 0.64	31.90 ^b ± 0.47	**	30.50 ^a ± 0.28	31.95 ^b ± 0.47	31.95 ^b ± 0.40	**
TEC (million/mm ³)	3.26 ± 0.01	3.41 ± 0.01	3.33 ± 0.01	NS	3.34 ^a ± 0.01	3.95 ^b ± 0.01	3.90 ^b ± 0.01	**	3.36 ^a ± 0.01	4.09 ^b ± 0.02	3.89 ^a ± 0.02	**
TLC (thousand/mm ³)	21.00 ^a ± 0.40	23.00 ^b ± 0.40	22.75 ^b ± 0.25	**	22.25 ^a ± 0.47	25.00 ^c ± 0.40	23.75 ^b ± 0.47	**	23.00 ^a ± 0.40	26.00 ^c ± 0.40	24.50 ^b ± 0.64	**
MCV (femtoliter)	92.79 ^a ± 0.25	93.10 ^b ± 0.22	92.34 ^b ± 0.10	**	92.81 ^a ± 1.00	80.37 ^c ± 0.09	81.79 ^b ± 0.12	**	90.77 ^a ± 0.12	78.11 ^c ± 0.11	82.13 ^b ± 0.20	**
MCH (picogram)	21.53 ^a ± 0.12	23.95 ^b ± 0.17	24.23 ^c ± 0.07	**	23.86 ^a ± 0.15	20.63 ^c ± 0.09	21.07 ^b ± 0.12	**	24.16 ^a ± 0.15	20.17 ^c ± 0.07	21.46 ^b ± 0.18	**
MCHC (g/dl)	23.20 ^a ± 0.26	25.73 ^b ± 0.08	26.24 ^c ± 0.14	**	25.70 ± 0.12	25.66 ± 0.12	25.76 ± 0.22	NS	26.62 ^a ± 0.14	25.82 ^c ± 0.16	26.13 ^b ± 0.30	**

**Shows Significance at 1% level as compared to control group (P < 0.01)

*Shows Significance at 5% level as compared to control group (P < 0.05)

The value with the different superscripts in a row is different significantly between groups

The value with the no superscripts in a row is having no significant relationship.

DISCUSSION

As per the results of present study, there were significant increase in the haemoglobin, total erythrocytes, total leucocytes, packed cell volume, MCV, MCH and MCHC in all supplemented groups as compared to control group. The observations of the present study are not in closed agreement with the findings of Makled and Afifi (2001), Jain (2008), Osman (2009), Prajapati (2010), Namra *et al.* (2011) Kwari *et al.* (2012), Jamre (2015), and Gautam (2015), because there was no significant difference found in haematological parameters in the study of these workers. As there was very little literature regarding different parameters of haematology in Kadaknath, so the comparison was done with broiler species and hence the changes recorded by other workers were not in accordance with the present study.

CONCLUSION

There was significant increase in the haemoglobin, packed cell volume, MCV and MCH in all supplemented groups as compared to control group. There was significant increase in the TEC in all supplemented groups as compared to control group except in GS0, GS1 and GS2 groups in 30 days after treatment except in GM0, GM1 and GM2 groups after 30 days of treatment. There was a significant change in TLC in all treated groups as compared to control group except in GM0, GM1 and GM2 groups after 30 days of treatment. There was a significant change in MCHC in all treated groups as compared to control group except in GS0, GS1 and GS2 groups in 60 days after treatment.

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