The influence of *Chakawar* (*Cassia tora*) and *Khesari* (*Lathyrus sativa*) seeds on the growth and biochemical performance in the blood of albino rats

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**ABSTRACT**

The present investigation was carried out to evaluate the feasibility of *Chakwa* (*Cassia tora*) and *Khesari* (*Lathyrus sativus*) seeds as animal feed supplement in the albino rats. Twenty five albino rats were selected and randomly divided into five groups of five each. The albino rats were fed on the basal ration (maize 25% + Bajra 25% + Gram chunni 50%) in group I (G1). In rest of the groups, 50% gram chunni was replaced with 50% unboiled *L. Sativus* (G2), 50% boiled *L. Sativus* (G3), 50% unboiled *C. tora* (G4) and 50% boiled *C. tora* (G5). The experimental feeding was conducted for a period of 42 days. The complete randomized block design (CRBD) was used for the analysis of data. The result revealed that the values of ether extract, crude fibre, total ash, calcium and phosphorous were found highest in *Chakwa* seed groups than the values obtained in *Khesari* seed groups. The feed efficiency ratio in group G3 was comparable to control group while it was nearly doubled in *Chakwa* fed groups. The feed intake and body weight gain was significantly (p<0.01) lowest in G4 and G5 respectively than rest of the groups. The differences in the heart, liver, spleen, lungs, and kidneys weight were not-significant between the groups. The significant increase (p<0.01) has been observed in blood glucose, creatinine and urea in group G2, blood glucose and urea in group G3, blood glucose, creatinine, urea and SGOT in group G4, blood glucose and creatinine in group G5 than the values obtained in control group. Contrary to this, a significant decrease (p<0.01) was observed in kidneys weight in group G2, blood creatinine, SGPT and lungs weight in group G3, lungs and kidneys weight in group G4, blood SGOT and heart weight in group G5 than the values obtained in control group. It can be thus concluded that boiled *Khesari* and *Chakwa* seeds are better than unboiled seeds and also *Khesari* is superior to *Chakwa* seed in respect of growth performance of rats.

**Key word:** Albino rats, Blood profile, *Cassia tora*. Internal body parts, *Lathyrus sativus*.

**INTRODUCTION**

There exists gross imbalance between demand and supply of feed and fodder for livestock feeding in our country. At present the deficit in the availability of green fodder, dry roughage and concentrate are 61.96, 22.08 and 63.03 per cent, respectively (Report, 2001). To bridge this gap, the nutritional potential of these seed needs to be assessed, which may be utilised as alternate feed supplement.

*Khesari* (*Lathyrus sativus* L.), is grown to a large area in India and also to some extent in a few other countries of the Eastern and Mediterranean regions. It can be used as a green fodder while seeds can be used for feeding of the animals. The major limitation to its use is the occurrence of toxin BOAA (B-n-oxalyl-amino alanine) which may cause neurolathyrism in human consumption (Amba et al., 2002 and Rudra et al., 2004). Lathyrism develops only when the consumption of seed is high (300 g daily) and it is used for a period of more than six months (Manay et al., 2008).

*Chakwa* (*Cassia tora* L.) is a *kharif* weed abundantly grown in the forest, road sides and fellow lands during monsoon. The Chakwa seed is rich in protein which can be fed to the livestock, avians and fish (Singh et al., 2001). Cassia species possess several medicinal value like hepatoprotective activities (Upadhyay et al., 2000 and Farswan et al., 2009), hypoglycemic activity (Daisy et al., 2010 and Verma et al., 2010), prevent skin disorder (Sridhar et al., 2007 and

**Abbreviations:** BUN, Blood urea nitrogen; B.W.G. Body Weight Gain; CRBD, Complete Randomized Block Design; F.E.R., Feed Efficiency Ratio; F.I., Feed Intake; NFE, Nitrogen-free extract; SGOT, Serum Glutamate Oxaloacetate Transaminase; SGPT, Serum Glutamate Piruate Transaminase.

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Roopashree et al., 2009), anti-inflammatory and anti-pyretic activity (Gobianand et al., 2010).

*Cassia tora* (Liener, 1989, Grant et al., 1991) and *Lathyrus sativus* (Manay et al., 2008) seeds often contain anti-nutritional factors, which are deleterious to animals as well as human consumption. These anti-nutritional factors need to be removed or eliminated by physical process such as extensive washing and heat treatment of the seeds without impairment of its nutritional value (Grant et al., 1991 and Manay et al., 2008). The long term consumption of such seeds may have deleterious effect upon body metabolism (Gumbmann et al., 1985, Grant et al., 1991).

Keeping in view of above facts, the present investigation was carried out to assess feasibility of these two feed ingredients as animal feed supplements when fed to albino rats.

**MATERIALS AND METHODS**

The above experiment was conducted in the Department of Animal Husbandry and Dairying, Institute of Agricultural Sciences, BHU, Varanasi, U.P., India. Maize, bajra, and gram chunni were collected from BHU dairy farm whereas *Khesari* seed was collected from the farmer’s field and *Chakwa* seed from the barran land of BHU. The seeds of *L. Sativus* and *C. tora* were boiled for 15 minutes to ensure the elimination of their toxin contents (Liener 1986, Grant et al., 1991). The study protocol was approved by Central Animal Ethical Committee of the University (No. Dean/11-12/CAEC/254).

Twenty five albino rats of similar body weight and body conformation were selected at fifth day after birth and randomly divided into five equal groups of five each with an average body weight of 26.7±3gm. Each group was housed in cleaned, disinfected and dried cages which had wire mesh grids in their base to facilitate collection of food spillage and faeces. The albino rats were fed *ad libitum* exclusively on the basal ration (maize 25% + Bajra 25% + gram chunni 50%) in group I (G1). In rest of the groups 50% gram chunni was replaced with 50% unboiled *L. Sativus* (G2), 50% boiled *L. Sativus* (G3), 50% unboiled *C. tora* (G4) and 50% boiled *C. tora* (G5). The experiment was conducted for a period of 42 days. Fresh and clean water was provided *ad libitum* daily. The feed intakes of the rats were monitored daily. The weight of rats and faeces were collected at every 7th day of the trial. At 42 days of age, the rats were kept hunger for 24 hours. The rats were made anaesthetics by using chloroform. Before one hour of slaughter, 1-1.5 ml of the blood samples were collected from the jugular vein of the rats in the samples tubes (Singh et al., 2006). The blood serum was separated by the centrifugal method for the analysis of biochemical parameters viz., serum glutamate oxaloacetate (SGOT), serum glutamate pyruvate transaminase (SGPT), urea, glucose and creatinine as per procedure described in Robonik Laboratory Manual (2011). After slaughter, abdominal cavity was opened and heart, spleen, liver, lungs and kidneys were removed from the body of rats and weighed separately as per technique adopted by Singh et al (2006).

The feed samples for proximate principles were analyzed as per AOAC (1990). Calcium and phosphorus were analyzed as following the standard procedures (Talapatra et al., 1940). Completely randomized block design was followed for statistical analysis (Panse and Sukhatme, 1978). Analysis of variance was used to study the differences among treatment means and they were compared by using ANOVA F-test statistic.

**RESULTS AND DISCUSSION**

**Chemical composition of feed ingredients (%)**: Among the unconventional feeds, the level of ether extract, crude fibre, total ash, calcium and phosphorous were the highest in Chakwa seed (boiled and unboiled) than the values obtained in Khesari seed (Table 1). The low level of CP, EE and NFE were obtained in boiled seeds than in unboiled seeds in both the cases.

**Effect of dietary treatments on the feed intake, body weight gain and feed efficiency ratio of albino rats**: The average feed consumption per rat per day (Table 2) were

| TABLE 1: Chemical composition of feed ingredients (dry matter basis in per cent) |
|------------------|-------|-------|---|---|---|---|---|
| Constituents     | Maize | Bajra | Gram chunni | *Lathyrus Sativus* | *Cassia tora* |
| Crude protein    | 9.80  | 12.50 | 12.80 | 28.90 | 28.60 |
| Ether extract    | 5.10  | 5.00  | 2.40  | 1.30  | 1.20  |
| Crude fibre      | 1.80  | 2.80  | 28.20 | 4.40  | 4.80  |
| NFE              | 81.80 | 77.90 | 49.90 | 62.30 | 61.90 |
| TCH              | 83.60 | 80.70 | 78.10 | 66.70 | 66.70 |
| Total ash        | 1.50  | 2.80  | 6.70  | 3.20  | 3.50  |
| Calcium          | 0.05  | 0.04  | 0.40  | 0.082 | 0.098 |
| Phosphorus       | 0.27  | 0.33  | 0.20  | 0.098 | 0.10  |

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**Chemical composition of feed ingredients (%)**: Among the unconventional feeds, the level of ether extract, crude fibre, total ash, calcium and phosphorous were the highest in Chakwa seed (boiled and unboiled) than the values obtained in Khesari seed (Table 1). The low level of CP, EE and NFE were obtained in boiled seeds than in unboiled seeds in both the cases.

**Effect of dietary treatments on the feed intake, body weight gain and feed efficiency ratio of albino rats**: The average feed consumption per rat per day (Table 2) were
significant lower (P<0.01) in groups G2, G4 and G5 than that of control group. The feed consumption was also decreased (P<0.05) in group G3 than the control. When compared within treatment groups, the feed intake per day in Khesari fed groups were recorded to be the highest (P<0.01) than the values recorded in Chakwa fed groups (Fig 1).

All the rats fed with Chakwa seed showed lower daily body weight gain (P<0.01) as compared to rats fed on Khesari and basal ration (Table 2). Khesari fed groups show almost similar body weight when compared with the control group (Fig 1).

**TABLE 2:** Effect of feeding *C. Tora* and *L. Sativus* on the feed intake, body weight gain and feed efficiency of albino rats

<table>
<thead>
<tr>
<th>GROUPS (Treatments)</th>
<th>Average Feed intake per rat/day (gm)</th>
<th>Average Body weight gain per rat/day (gm)</th>
<th>Average Feed efficiency (gm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (G1 or a)</td>
<td>5.24 ±0.59</td>
<td>0.85 ±0.18</td>
<td>6.64 ±0.28</td>
</tr>
<tr>
<td><em>Lathyrus Sativus</em> (G2 or b)</td>
<td>4.37 ±0.11</td>
<td>0.63 ±0.15</td>
<td>6.29 ±0.15</td>
</tr>
<tr>
<td>(unboiled)</td>
<td>(-16.68)</td>
<td>(-2.59)</td>
<td>(-5.25)</td>
</tr>
<tr>
<td><em>Lathyrus Sativus</em> (G3 or c)</td>
<td>4.64 ±0.56</td>
<td>0.84 ±0.14</td>
<td>6.52 ±0.15</td>
</tr>
<tr>
<td>(boiled)</td>
<td>(-1.41)</td>
<td>(-0.71)</td>
<td>(-1.36)</td>
</tr>
<tr>
<td><em>Cassia tora</em> (G4 or d)</td>
<td>3.40 ±0.52</td>
<td>0.40 ±0.27</td>
<td>12.23 ±0.21</td>
</tr>
<tr>
<td>(unboiled)</td>
<td>(-35.15)</td>
<td>(-32.83)</td>
<td>(84.21)</td>
</tr>
<tr>
<td><em>Cassia tora</em> (G5 or e)</td>
<td>3.67 ±0.40</td>
<td>0.30 ±0.17</td>
<td>16.23 ±0.50</td>
</tr>
</tbody>
</table>

Values are means ± SEM, n=5. Data in the parenthesis represents percentage increase or decrease in comparison to control. ** Significant (P<0.01) and * Significant (P<0.05). SEM= standard error mean, CD= critical difference. a, b, c, d and e in the parenthesis denotes different groups.

The data presented in Table 2 indicate that the diet supplemented with 50% unboiled Khesari resulted in minimum feed efficiency in group G2 (6.29±0.15). The values found in Chakwa fed groups were significantly (P<0.01) lower than the rest of the groups. The differences in the values among Chakwa fed groups were also found significant (Fig 1).

**Effect of dietary treatments on the internal body parts:** heart, liver, spleen, lungs and kidney of albino rats: The per cent heart weight of the body weight (Table 3) decreased (P<0.05) in boiled *Chakwa* fed group than that of control group. Its value was recorded to be the maximum in G1 (0.44±0.04) followed by G3 (0.41±0.02) and lowest in G5 (0.36±0.02). In Khesari fed groups, the per cent heart weight was apparently higher in G3 than that of G2. The per cent heart weight in *Chakwa* fed groups decreased to 18.18 and 15.91 per cent in G5 and G4, respectively than control group.

The per cent liver weight of the body weight (Table 3) increased (P<0.05) in G2 than the values found in Chakwa fed groups. In Khesari fed groups, the per cent liver weight in G2 increased (8.27%) than that of control group. The per cent liver weight in Chakwa fed groups apparently decreased to 9.27 and 7.77 per cent in G4 and G5, respectively than that of control group.

The per cent spleen weights of the body weight (Table 3) in all the groups were at par.

The per cent lungs weights of the body weight (Table 3) decreased (P<0.05) in G3 and G4 than that of control group (Table 3). The per cent lungs weight was found maximum in G1 (0.67±0.03%) and minimum in G3 (0.52±0.05%) than other groups.

**TABLE 3:** Impact of feeding *Lathyrus sativus* and *Cassia tora* feed on some parameter of the internal body parts and blood chemistry of albino rats

<table>
<thead>
<tr>
<th>Groups (Treatments)</th>
<th>Heart (%)</th>
<th>Liver (%)</th>
<th>Spleen (%)</th>
<th>Lung (%)</th>
<th>Kidney (%)</th>
<th>Glucose (mg/dl)</th>
<th>Creatinine (mg/dl)</th>
<th>Urea (mg/dl)</th>
<th>SGOT (U/L)</th>
<th>SGPT (U/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control (G1 or a)</td>
<td>0.44 ±0.04</td>
<td>3.99 ±0.26</td>
<td>0.26 ±0.07</td>
<td>0.67 ±0.03</td>
<td>0.96 ±0.05</td>
<td>129.95 ±1.62</td>
<td>0.64 ±1.33</td>
<td>25.46 ±1.25</td>
<td>125.7 ±1.20</td>
<td>55.2 ±1.10</td>
</tr>
<tr>
<td><em>Lathyrus Sativus</em> (G2 or b)</td>
<td>0.39 ±0.05</td>
<td>4.32 ±0.26</td>
<td>0.26 ±0.07</td>
<td>0.57 ±0.08</td>
<td>0.78 ±0.08</td>
<td>234.75 ±1.25</td>
<td>0.94 ±1.20</td>
<td>33.87 ±1.25</td>
<td>127.2 ±1.20</td>
<td>59.26 ±1.20</td>
</tr>
<tr>
<td>(unboiled)</td>
<td>(-11.36)</td>
<td>(8.27)</td>
<td>(-0.76)</td>
<td>(-15.05)</td>
<td>(-18.32)</td>
<td>(84.05 ±1.25)</td>
<td>(50.00 ±1.25)</td>
<td>(33.03 ±1.25)</td>
<td>(-1.19)</td>
<td>(-7.36)</td>
</tr>
<tr>
<td><em>Lathyrus Sativus</em> (G3 or c)</td>
<td>0.41 ±0.04</td>
<td>3.67 ±0.27</td>
<td>0.25 ±0.06</td>
<td>0.52 ±0.08</td>
<td>0.84 ±0.06</td>
<td>277.15 ±1.25</td>
<td>0.47 ±1.20</td>
<td>31.17 ±1.25</td>
<td>124.8 ±1.25</td>
<td>53.74</td>
</tr>
<tr>
<td>(boiled)</td>
<td>(-6.82)</td>
<td>(-5.76)</td>
<td>(4.58)</td>
<td>(-21.91)</td>
<td>(-12.42)</td>
<td>(+113.27)</td>
<td>(+22.43)</td>
<td>(-0.72)</td>
<td>(-2.64)</td>
<td></td>
</tr>
<tr>
<td><em>Cassia tora</em> (G4 or d)</td>
<td>0.37 ±0.02</td>
<td>3.67 ±0.26</td>
<td>0.26 ±0.05</td>
<td>0.53 ±0.08</td>
<td>0.78 ±0.05</td>
<td>182.65 ±1.20</td>
<td>0.68 ±1.20</td>
<td>37.5 ±1.20</td>
<td>185.4 ±1.20</td>
<td>56.4</td>
</tr>
<tr>
<td>(unboiled)</td>
<td>(-15.91)</td>
<td>(-9.27)</td>
<td>(-7.06)</td>
<td>(-19.67)</td>
<td>(-18.84)</td>
<td>(+40.55)</td>
<td>(+6.25)</td>
<td>(+7.49)</td>
<td>(+2.17)</td>
<td></td>
</tr>
<tr>
<td><em>Cassia tora</em> (G5 or e)</td>
<td>0.36 ±0.02</td>
<td>3.68 ±0.26</td>
<td>0.26 ±0.06</td>
<td>0.56 ±0.08</td>
<td>0.82 ±0.04</td>
<td>141.9 ±1.20</td>
<td>0.67 ±1.20</td>
<td>24.92 ±1.20</td>
<td>107 ±1.20</td>
<td></td>
</tr>
<tr>
<td>(boiled)</td>
<td>(-10.18)</td>
<td>(-7.77)</td>
<td>(-2.29)</td>
<td>(-16.39)</td>
<td>(-14.39)</td>
<td>(+9.20)</td>
<td>(+4.69)</td>
<td>(-2.12)</td>
<td>(-14.88)</td>
<td></td>
</tr>
<tr>
<td>CD (5%)</td>
<td>0.07 ±0.10</td>
<td>0.479 ±0.24</td>
<td>0.046 ±0.06</td>
<td>0.114 ±0.16</td>
<td>0.165 ±0.22</td>
<td>6.534 ±0.015</td>
<td>3.111 ±0.015</td>
<td>4.778 ±0.015</td>
<td>3.469</td>
<td></td>
</tr>
</tbody>
</table>

Values are means ± SEM, n=4. Data in the parenthesis represents percentage increase or decrease in comparison to control. ** Significant (P<0.01) and * Significant (P<0.05). SEM= standard error mean, CD= critical difference. a, b, c, d and e in the parenthesis denotes different groups.
The per cent kidney weight of the body weight (Table 3) decreased (P<0.05) in G2 (0.78±0.08%) and G4 (0.78±0.05%) both as compared to control group (0.96±0.05%). No significant differences were observed amongst different treatment groups.

Effect of dietary treatments on blood profile: glucose, creatinine, urea, SGOT and SGPT: The level of blood glucose (Table 3) was significantly (P<0.01) higher in all the groups as compared to control group. The differences in the values among the groups fed with Khesari and Chakwa were also found significant (P<0.01). The maximum blood glucose was recorded in G3 (277.15±1.70 mg/dl), while the minimum in control group (129.95±1.70 mg/dl). In Khesari fed groups, the level of glucose was recorded to be the highest in G3 (277.15±1.70 mg/dl) than the value obtained in G2 (234.75±1.45 mg/dl). The blood glucose increased to 80.64 % in G2 and 113.27 % in G3 as compared to control group. In Chakwa fed groups, G4 showed the highest glucose level (277.15±1.70 mg/dl) than the value recorded in G5 (141.90±1.60 mg/dl). The blood glucose increased to 40.54 % in G4 and 9.19 % in G5 as compared to control group (Fig 3).

The average blood creatinine value (Table 3) was significantly (P < 0.01) higher in all the groups than the control. The differences within the treatment groups were also significant (P < 0.01) except in Chakwa fed groups. The creatinine levels in all the groups were within the normal range (0.50 to 1 mg/dl) as given in Research Bulletin (2010-11). In Khesari fed groups, the level of creatinine in G2 (0.94 ±0.00 mg/dl) increased (P < 0.01) and in G3 decreased (0.47±0.00 mg/dl) than the control group (0.64±0.00 mg/dl). In Chakwa fed groups, the creatinine levels of blood was higher in G4 (6.25%) and G5 (4.69%) than the control group. The blood urea significantly increased (P<0.01) to 7.36 % in group G2, whereas decreased to 2.64 % in group G3 when compared with control group. The SGPT level in Chakwa fed groups increased to 2.17 % in group G4 whereas decreased to 3.99 % in group G5 than the value found in control group.

Chemical composition of feed ingredients (%): The effect of boiling was not significant on the chemical composition of L. Sativus and C. tora seeds. The level of protein, ether extract and NFE were apparently reduced in boiled seeds in both the ingredients. The reduction in the composition of boiled seeds might be due to removal of these constituents in the water during boiling. The calculated value of crude fibre and total ash were the maximum in boiled seeds due to removal of other constituents in the water.
Feed intake, body weight gain and feed efficiency ratio

Persuaded by the Table 2, it is clear that as the age of rats increased, the feed intake in rats of almost all the groups increased significantly (P < 0.01). This was due to biological demand for physiological functions of the body for growing rats. In the Khesari fed groups, feed intake per day were higher than Chakwa fed groups. These findings were similar to the finding reported by Singh et al. (1979), Pandita et al. (1979) and Adam et al. (2001). However, Nag (1997) reported that Chakwa seed had no significant impact on feed intake of rats.

Grela et al. (1998) and Mieczan and Kwiecien (2010) reported that khesari seeds feeding led to weaker growth performance in pigs which is corroborating with the result of present investigation. Similar to our findings, reduction in daily body weight gain on feeding Chakwa seed was also reported by Adam et al. (2001), Obidah et al. (2009), Sabu and Subburaju (2002). Contrary to this result, increase in daily body weight gain on feeding Chakwa seed were reported by Kadiiri et al. (1996), Singh et al. (2001), and Verma et al. (2010), Cassia tora seeds were highly toxic and therefore rat’s given diets containing these seeds had low food intake, rapidly lost weight and had a high incidence of mortality (Grant et al. 1991).

Singh et al. (2001) found lower feed conversion ratio in C. tora fed groups of boiler than the control, which was similar to the present finding.

Internal body parts: heart, liver, spleen, lungs and kidney:

In present investigation the per cent heart weight in Chakwa fed groups decreased than the value obtained in control group. However this decrease was not significant in unboiled Chakwa fed groups. Roopashree et al. (2009) found normal range of heart weight in Cassia species fed group similar to present investigation.

Budag et al. (2009) and Mieczan and Kwiecien (2010) reported that Khesari feeding to pigs led to positive effect on liver, which is similar to our findings when unboiled Khesari was fed to rats. The per cent liver weight in Chakwa fed groups apparently decreased than the value of control group. This reduction in liver weight might be due to reversal of toxin induced adrenomedullary response and hence decreases production of corticotrophin hormone (Roshan et al., 2010). Reduction in liver function has also been reported by Rastegar et al. (2008) when Cassia species was fed to rats. This finding corroborate with our findings. Farswan et al. (2009) and Roopashree et al. (2009) found the normal range of per cent liver weight in Cassia species fed group which is contrary to our results.

The similar per cent spleen weights of the body weight in all the groups might be due to the constant recruitment of lymphocytes to blood from spleen. But, Roshan et al., 2010, have reported that pre-treatment with ethanolic extract of Nigella Sativa (EENS) significantly increased the spleen weight.

It is clear from the data that lungs per cent weight decreased with the addition of both Khesari and Chakwa seed in the feed. This reduction was the highest in group G2 (21.91%) followed by group G4 (19.67%) as compared to the value of control group.

Mieczan and Kwiecien (2010) reported that higher share of Khesari in feed of pigs led to hypertrophy of kidney which was not observed in this study. This might be due to the difference in type of animal selected for experiment. Roopashree et al. (2009) reported no change in renal function when Chakwa seed was fed to rats which are contrary to present study.

Impact on blood profile: glucose, creatinine, urea, SGOT and SGPT:

The blood glucose content in Khesari fed groups was nearly 1.5 times higher than the normal range (50 to 160 mg/dl) as given in Research Bulletin (2010–11). Higher value may be due to anti effects of saponine and beta-N-oxalyl-L-alpha-diaminopropionic acid (ODAP or BOAA) present in Chakwa seed. In Chakwa fed groups, our findings were at par with the views reported by Kadiiri et al. (1996) when Chakwa seed was fed to rats. However, Sabu et al. (2002), Nam and Hyunju (2008), Farswan et al. (2009) and Daisy et al. (2010) reported that Cassia species seed had reduced the level of blood glucose which was not true in our case. This might be due to species difference and use of diabetes rats for the experiment. The toxins present in these seeds may cause stress. In response to stress ACTH is released which acts on adrenal cortex where by cortisol and corticosterone will be secreted. Increased plasma cortisol influences the mobilization of stored fat and carbohydrate reserves, which in turn increases blood glucose level (Roshan et al., 2010).

In Khesari fed groups, the level of creatinine in group G2 increased and this increased blood creatinine value always indicates impaired kidney function (Allston, 1993 and Robonik Laboratory manual, 2011). Due to this reason, the body weight of the rats in the G2 might be decreased to 2.59% than the control group. However, in Chakwa fed groups our findings were not in accordance with the observations of Farswan et al. (2009) and Mutalik et al. (2005) which might be due to difference in Cassia species in the experiment.

Higher BUN (blood urea nitrogen) level in group G2 may be due to use of unboiled Khesari containing anti-
nutrient materials i.e. nitrate which is changed into nitrite by the bacteria present in the body. Increased in BUN level was reported by Budag et al. (2009) when leguminous grain feeds were used in lamb ration. This finding was parallel with our results, when unboiled Khesari seeds were fed to the rats. In group G3 showed decreased levels of BUN in rats. This might be due to inhibition of stimulation of sympathetic nervous system. The reduction in BUN has also been reported by Trombetta et al. (2006) when L. Sativus seed were fed to pigs. In Chakwa fed groups, the mechanism by which group G4 raised serum BUN levels in rats might be due to the enhanced activity of hypothalamo-hypophyseal axis resulting in increased liberation of corticosteroids. This might be the reason for highest decrease (35.15%) in relative feed intake in group G4. The increased in BUN levels in unboiled Cassia species fed rats were similar as reported by Adam et al. (2001) and Obidah et al. (2009). Mutalik et al. (2005) reported reduction but Rastegar et al. (2008) and Roopashree et al. (2009) reported no change in BUN when Cassia species were fed to rats.

Mieczan and Kwiecien (2010) reported increased SGOT level when seed of L. sativus were fed to pigs. This finding was similar to the results of present investigation when unboiled Khesari seed were fed to rats. Contrary to this result, Budag et al. (2009) reported reduction in the values when leguminous grain feeds were used in lamb ration. Increased SGOT enzyme activity in group G4 was at par with the views reported by Adam et al. (2001), Rastegar et al. (2008) and Obidah et al. (2009) when unboiled Cassia species were fed to rats. Contrary to this result, Mutalik et al. (2005) and Farswan et al. (2009) reported reduction in SGOT but Roopashree et al. (2009) found no change in SGOT enzyme activity when Cassia species were fed to rats.

In Khesari fed groups, increased level of SGPT in group G2 might be due to the effect of neurotoxins present in the seeds resulting, which might disturb the normal liver function. This might be the reason for decreased (2.59 %) average body weight gain of the rats in group G2 than that of control group. Our finding was corroborating with the findings of Mieczan and Kwiecien (2010) when seed of L. Sativus were fed to pigs. Contrary to our findings, Budag et al. (2009) found no change in SGPT activity when leguminous grain feeds were used in lamb ration. In Chakwa fed groups, reduction in the level of SGPT in group G5 might be due to the effect of heat or toxin removed during boiling, draining and washing with water. This finding was at par with Mutalik et al. (2005) and Farswan et al. (2009) when seed of Cassia species were fed to normal rats. Adam et al. (2001), Rastegar et al. (2008) and Obidah et al. (2009) reported increase in SGOT enzyme in the blood but Roopashree et al. (2009) found no change in this enzyme activity when Cassia species were fed to rats. These findings were not corroborating with our findings.

CONCLUSION
It can be concluded that boiled Khesari and Chakwa seeds are better than unboiled seeds. Out of these two types of seeds, Khesari is superior to Chakwa seed in respect of growth performance of rats. Khesari seed can be fed to rats but Cassia tora seed was not suitable for rats. 

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REFERENCES


