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# STUDY ON CARCASS TRAITS OF GROWING-FINISHING PIGS FED DIFFERENT LEVELS OF GREEN BERSEEM IN A BASAL DIET OF KITCHEN WASTE

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## ABSTRACT

**An experiment was conducted to see the effect of different level of green berseem on carcass traits of finishers pigs. No significant difference were observed among groups for dressing percentage (with and without head), carcass length, back fat thickness, total edible and inedible offals and visceral organs percentage. Significant differences were observed among caecum length and fat thickness at 10th rib. Proximate composition of carcass indicated no significant difference for moisture content, but significant difference for crude protein (<0.05) and Ether Extract (<0.01). Ether extract was found to be highest for $T_1$ followed by $T_2$, $T_3$ and $T_4$. It was concluded that green berseem can be introduced into the diet of pigs up to 25% without affecting the performance adversely.**

***Key words:*** *Berseem, carcass, kitchen waste and pig.*

Pigs, being highly prolific farm animals among all domestic animals, are raised for the production of meat at comparatively lower price. Because of direct competition with human for grains, there is need to find substitutes and alternative feedstuffs for pigs. Considerable attention has therefore been directed in recent years towards the use of fibrous and bulky feeds for pigs. The different fibrous materials used in pig feeding, have been reported. Thus, forages can be used successfully in pork production6 but to a limited extent for young pigs because of low-energy density and high fiber content (25-30%). Alfalfa, Berseem, Ladino, Lespedeza, Red clover, Sweet clover are some legumes that may be used for swine feeding. Berseem or Egyptian clover (*Trifolium alexandrinum*) is a well-known leguminous fodder grown in different parts of India. Though, it is being used only in the ruminants thus efforts are being made to use it for non-ruminants to minimize the use of grains in feed.

## MATERIALS AND METHODS

The experiment was conducted at Swine Production Unit, Department of Livestock Production and Management, College of Veterinary and Animal Sciences, G.B.P.U.A.&T., Pantnagar, Uttarakhand. A total of twenty four LWY pigs (approx. 5 months old) nearly of same body weight were selected for the study. The study was conducted nearly for 2 months. The pigs were divided into 4 groups ($T_1$, $T_2$, $T_3$ and $T_4$) having 6 in each. Distributions of feed in different such groups have been presented in Table-1. All the piglets were allowed for ad. lib. feeding. All piglets of groups were kept separately replicate wise in individual pen measuring 2.5x3 sq. m. Kitchen wastes were provided in fresh form after collecting from mess on the same day. Chopped green berseem was provided after overnight wilting. Three pigs of each group of experiment were slaughtered at the end of experiment (7 Months) to study different carcass traits. All pigs were fasted 24 h before slaughter. Carcass data were collected as follows: hot carcass weight; dressing percentage, carcass length (anterior edge of first rib to pubic bone); liver, kidney, lungs, spleen and heart weight; backfat (mean of three measurements on split carcass at first rib, last rib and last lumbar vertebra); and fat thickness at the $10^{th}$ rib, weight of different primal cuts etc. The data were compared for statistical significant by analysis of variance (ANOVA) and the critical difference (CD) were calculated to determine significant difference among the treatment means as described (1).

## RESULTS AND DISCUSSION

Highest live weight at the time of slaughtering was observed in group I (80.33 ± 5.36) followed by group IV (76.00 ± 3.05), II (72.50 ± 1.37) and III (71.60 ± 2.96). However, no significant difference was observed among the groups (Table-3). The results are in close agreement with the findings (2). Reduced weight gain in later groups might be due to the fact that reduced

**Table-1:** Feed composition of different groups

| **Group I/Control ($T_1$)** | **Group II ($T_2$)** | Group III **($T_3$)** | Group IV **($T_4$)** |
|---|---|---|---|
| 10 % Green berseem + 40% balanced ration + 50 % Kitchen waste | 15 % Green berseem + 35% balanced ration + 50 % Kitchen waste | 20 % Green berseem + 30% balanced ration + 50 % Kitchen waste | 25 % Green berseem + 25% balanced ration + 50 % Kitchen waste |

**Table-2:** Proximate composition of rations of different groups

| **Treatments** | **CP** | **EE** | **CF** | **NFE** | **Ash** | **OM** |
|---|---|---|---|---|---|---|
| $T_1$ | 20.07 | 9.47 | 7.58 | 55.26 | 7.62 | 92.38 |
| $T_2$ | 19.99 | 9.44 | 7.97 | 54.90 | 7.70 | 92.30 |
| $T_3$ | 19.91 | 9.41 | 8.36 | 54.55 | 7.77 | 92.23 |
| $T_4$ | 19.82 | 9.38 | 8.76 | 54.18 | 7.86 | 92.14 |

**Table-3:** Different carcass traits of pigs under different treatments

| **Parameters** | T1 | T2 | T3 | T4 |
|---|---|---|---|---|
| Live weight at slaughter (kg) | 80.33±5.36 | 72.50±1.37 | 71.6±2.96 | 76.00±3.05 |
| Hot carcass weight | 52.57±3.93 | 47.50±2.44 | 48.00±1.73 | 51.77±0.23 |
| Dressing % (with head) | 71.94±0.12 | 73.39±0.89 | 74.79±0.74 | 75.77±3.57 |
| Dressing% (without head) | 65.37±0.51 | 65.59±0.64 | 67.01±0.70 | 68.35±2.98 |
| Back fat thickness (cm) | 3.41±0.09 | 2.70±0.18 | 2.89±0.36 | 3.21±0.07 |
| $10^{th}$ rib fat thickness (cm) | 3.57±0.12 [a] | 2.50±0.29 [b] | 2.33±0.27 [b] | 2.73±0.15 [b] |
| Carcass length (inches) | 27.00±0.76 | 27.50±0.64 | 27.23±0.15 | 27.50±0.29 |

**Table-4:** Edible offal weight (kg) of pigs under different treatments.

| **Parameters (Kg)** | **$T_1$** | **$T_2$** | **$T_3$** | **$T_4$** |
|---|---|---|---|---|
| Total edible offal Weight | 17.30±0.82 | 17.56±0.88 | 17.47±0.39 | 18.43±0.21 |
| Head | 5.23±0.03 | 5.63±0.17 | 5.57±0.15 | 5.60±0.23 |
| Tail | 0.16±0.02 | 0.16±0.02 | 0.18±0.02 | 0.22±0.02 |
| Trotters | 1.48±0.43 | 1.55±0.34 | 1.60±0.32 | 1.58±0.36 |
| Heart | 0.24±0.02 | 0.26±0.03 | 0.25±0.003 | 0.29±0.06 |
| Liver | 1.52±0.02 | 1.46±0.09 | 1.36±0.10 | 1.72±0.09 |
| Kidney | 0.30±0.03 | 0.30±0.04 | 0.29±0.02 | 0.30±0.02 |
| Stomach | 0.60±0.01 | 0.56±0.02 | 0.55±0.02 | 0.60±0.003 |
| Intestine | 7.82±0.29 | 7.62±0.21 | 7.68±0.12 | 8.12±0.07 |
| Caecum length (c.m.) | 17.83±0.29a | 21.33±0.67b | 23.00±1.00 bc | 25.00±1.15 c |
| **Inedible offals** | | | | |
| Total inedible offal weight (Kg) | 3.28±0.24 | 2.94±0.25 | 2.58±0.11 | 2.64±0.19 |
| Mesentric fat (Kg) | 1.95±0.13 | 1.58±0.12 | 1.58±0.08 | 1.61±0.06 |
| Uterus/Testis | 0.52±0.04 | 0.38±0.11 | 0.50±0.09 | 0.45±0.06 |
| Lungs (Kg) | 0.69±0.08 | 0.86±0.02 | 0.78±0.13 | 0.97±0.13 |
| Spleen (Kg) | 0.12±0.01a | 0.12±0.01 b | 0.11±0.01 b | 0.15±0.00 b |
| Loin eye area (cm2) | 24.50±0.29 | 27.00±0.29 | 27.00±1.00 | 28.17±1.42 |
| Primal cut (Kg) | 29.32±1.25 | 25.45±1.52 | 25.63±1.13 | 27.22±0.57 |

**Table-5:** Primal cuts (Percent of dressed carcass weight) of pigs under different treatments

| **Parameters** | **$T_1$** | **$T_2$** | **$T_3$** | **$T_4$** |
|---|---|---|---|---|
| Primal cut | 36.61±0.91 | 35.12±0.43 | 35.77±0.70 | 35.99±2.27 |
| Buzzton butt | 10.06±0.88 | 9.02±0.97 | 11.23±1.63 | 9.41±0.94 |
| Picnic shoulder | 14.66±0.45 | 15.77±0.74 | 17.47±1.11 | 16.74±2.01 |
| Total shoulder | 24.71±0.44 | 24.78±1.32 | 28.70±1.71 | 26.15±1.55 |
| Ham | 23.03±0.83 | 18.81±0.47 | 23.15±1.22 | 22.98±1.50 |
| Loin | 42.95±3.27 | 35.26±3.07 | 37.55±1.25 | 35.54±1.66 |
| Belly | 21.54±0.83 a | 17.28±1.04 b | 18.68±0.90 bc | 20.48±0.62 ac |

**Table-6:** Organs weight percentage of pigs under different treatments.

| Parameters | $T_1$ | $T_2$ | $T_3$ | $T_4$ |
|---|---|---|---|---|
| Edible offal | 21.59±0.40a | 24.25±0.36 b | 24.43±0.72 b | 24.33±0.93 b |
| Inedible offal | 4.08±0.66 a | 4.05±0.12 a | 3.59±0.04 bc | 3.46±0.11 c |
| Heart | 0.30±0.003 | 0.36±0.03 | 0.35±0.02 | 0.38±0.06 |
| Liver | 1.86±0.08 | 2.02±0.01 | 1.91±0.12 | 2.28±0.20 |
| Kidney | 0.37±0.02 | 0.41±0.04 | 0.40±0.02 | 0.40±0.02 |
| Lungs | 0.86±0.04 | 1.19±0.06 | 1.08±0.14 | 1.27±0.12 |
| Spleen | 0.16±0.12 a | 0.17±0.01 a | 0.15±0.01 a | 0.20±0.01 b |

**Table-7:** Proximate composition of carcass (% on DM basis) of different groups

| Parameters | $T_1$ | $T_2$ | $T_3$ | $T_4$ |
|---|---|---|---|---|
| Moisture | 72.07±0.30 | 72.19±0.46 | 72.11±0.78 | 72.80±0.13 |
| Crude Protein | 72.47±0.47 a | 70.82±0.34 b | 72.34±0.40 a | 73.02±0.05 a |
| Ether Extract | 8.67±0.19 a | 6.78±0.04 b | 6.25±0.03 c | 5.43±0.11 d |

digestible energy and high fiber intake. Similarly, no significant difference was observed among groups for hot carcass weight. It was found in a range of 47.50 kg to 52.57 kg. This finding is in agreement4.

The dressing percentage (with and without head) in the present study was higher for group IV followed by III, II and I. The dressing percentage (without head) in different treatment groups ranged from 65.37 ± 0.51 (group I) to 68.35 ± 2.98 (group IV) and with head it was 71.94±0.12 (groupI) to 75.77±3.57 (groupIV). However, no significant difference was observed among different treatment groups. The value of dressing percentage (with head) is in agreement with the finding(3). Result clearly indicated that dressing percentage increases as the percentage of green berseem increases in diet. The results are in agreement (2).

The maximum carcass length (inches) was observed in group IV (27.50 ± 0.29) and II (27.50 ± 0.64) followed by group III (27.23 ± 0.15) and I (27.00 ± 0.76) (Table-3). However no significant differences were observed among groups. The carcass length recorded in present investigation is almost nearer to the finding2. Maximum back fat thickness (cm) was observed for group I (3.41 ± 0.09) followed by group IV (3.21 ± 0.07), III (2.89 ± 0.36) and II (2.70±0.18) respectively, showing no significant difference. Results are in close agreement with the finding (2). The higher back fat thickness in group I indicated the effect of high plane of nutrition which led to conversion of excess energy in to fat during the finishing period. Fat thickness at $10^{th}$ rib was also significantly (<0.05) highest for group I (3.57 ± 0.12 cm) followed by IV (2.73 ± 0.15 cm), II (2.50 ± 0.29 cm) and III (2.33 ± 0.27 cm) respectively. This finding might be due to the reason mentioned for back fat thickness.

Loin eye area ($cm^2$) was observed to be higher for group IV (28.17±1.42) followed by group III (27.00±1.00), II (27.00±0.29) and I (24.50 ± 0.29). However no significant difference was observed among treatments. The result is in close agreement with the finding.

**Edible offal weight :** Total edible offal weight were compared among treatments and observed that lower but non-significant total edible offal weight was found in group I compared to other groups, which might be due to the fact that lower weight of trotters, heart, liver, kidney, and intestine (Table-4). Similarly, other edible offal viz. head, tail, trotters and heart was found to be lowest in group I compared to other three groups however, the differences among groups were non-significant. No definite trends were observed in other edible offal weight viz. liver, kidney, stomach and intestine and the differences among groups were found to be non-significant. Significantly ($p<0.01$) longest caecum length (c.m.) were observed for group IV (25.00) followed by group III (23.00), II (21.33) and I (17.83). It might be concluded on the basis of these observations that addition of green berseem increases the percentage weight of heart, liver, kidneys, lungs and spleens. However no significant difference was observed among groups for all organs. Our findings are in close agreement with the finding (4), who reported non-significant but heavier organ weight in pigs fed in dry lot plus grasses in comparison to pigs fed in dry lot only. There were no significant differences for intestine and stomach weight among groups. Caecum length was also measured which shows significantly ($P<0.01$)

highest length for group IV followed by group III, II and I. Our results are in close agreement with the finding (5), who concluded that gastro-intestinal tract shows a hypertrophic response to a high fibre diet.

Primal cuts (Percent of dressed carcass weight): The primal cuts (Buzzton butt, Picnic shoulder, Ham, Loin and Belly) percentage was found to be highest for treatment I followed by IV, III and II respectively. However no significant differences were observed among treatments. These findings are in close agreement with the findings (6).

**Inedible offal weight :** Highest total inedible offal weight (kg) was observed in group I followed by group II, IV and III however, the differences among groups were found to be non-significant (Table-5). Highest inedible offal weight for group I was might be due to heavier mesenteric fat followed by group IV, III and II, however the difference among groups were non-significant. Weight of other inedible offals viz. Uterus/testis and lungs was also found to be non-significant. However, weight of spleen was found to be significantly ($p<0.05$) highest for group IV followed by group I, II and III, no significant difference were observed among later three groups.

**Organ weight percentage :** Percentages of different organs weight were observed among groups (Table-6). Significant ($p<0.05$) difference were observed among groups for edible offal weight percentage. Lowest edible offal weight percentage was observed for group I (21.59) followed by group II (24.25), IV (24.33) and III (24.43). However no significant differences were observed among later three groups.

Inedible offal weight percentage was found to be significantly ($p<0.01$) highest for group I (4.08) followed by group II, III and IV. However, no significant differences were observed between group I and II and group III and IV. Other organs viz. heart, liver, kidney, lungs and spleen shows neither significant difference nor definite trend among groups.

The results clearly indicated that relative weights (percentage of live body weight) of heart, liver, kidney, lungs and spleen was greater in group IV pigs fed highest green berseem than other groups fed low green berseem. Our results are in close agreement with the findings9 who reported relative weights (percentage of live body weight) of liver, heart, empty stomach, small intestine, cecum and colon and full stomach and colon were greater in pigs fed high than in pigs fed low alfalfa meal.

**Proximate carcass composition :** Proximate composition of pork of different treatments shows no significant difference between the moisture content of pork. The crude protein percent was found to be significantly ($P<0.05$) lower in group II (70.82), followed by group I (72.47), III (72.34) and IV (73.02) however, no significant difference were observed among later three groups (Table-7). Significantly ($P<0.01$) highest ether extract was found in group I ($8.67 \pm 0.19$) followed by group II ($6.78 \pm 0.04$), III ($6.25 \pm 0.03$) and IV ($5.43 \pm 0.11$) respectively, which differ significantly among each other. The result clearly indicated that ether extract decreased on feeding high level of green berseem. Our findings are in close agreement with the findings8, who reported moisture%, crude protein% and ether extract% from proximate composition of Logissimus dorsi muscle ranged from 72.05-74.77, 64.31-77.11 and 4.77-17.09. Approximately similar percentage of water in the Logissimus dorsi muscle averaged 73.8 and 73.6, but lower protein 23.0 and 22.7 and fat 2.0 and 2.3 percent in Camborough and Hypor pigs, respectively (7).

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