

Original Research Article

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Effect of Feed Restriction on Serum Biochemical Profile in Ram Lambs

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ABSTRACT

Keywords

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Thirty two ram lambs (11.3 kg \pm 0.3) randomly divided into 4 groups were subjected to four feeding regimes to evaluate the effects of feed restriction levels on biochemical parameters in a CRD model. The restricted phase for a period of 8 weeks was followed by realimentation phase for 4 weeks. Four treatments containing 8 animals in each were subjected to feed restriction at 0, 10, 20 and 30 percent. The serum cholesterol ($P<0.05$) and albumin linearly increased from T1 to T4 with the increasing levels of feed restriction. The same results were obtained for serum albumin and HDL Cholesterol and were non-significant. During realimentation phase, the serum cholesterol was highest ($P<0.05$) for T1 as compared to other treatments. Similar results were observed for T1 ($P<0.05$) for total proteins and HDL Cholesterol. Both the values were higher for T1 as compared to other groups. The other parameters like albumin and globulin were comparable among treatments. It was concluded that feed restriction and realimentation has a considerable effect on the serum biochemical parameters. Cholesterol and HDL (mg/dl) were the parameters highly affected ($P<0.05$) during the study while the albumin concentration remains mostly unchanged.

Introduction

To make any livestock enterprise credible, economic practices needs to be practiced. In Animal Nutrition today, the nutritional needs of the farm animals are well understood and different feeding strategies are followed to adopt economic measures.

One of the established feeding procedures to follow feed economy is the feed restriction followed by *ad libitum* feeding to attain compensatory growth. Many reports say that

compensatory growth may be influenced by genetic factors, age of the animals at which restriction was imposed, severity and duration of restriction (Benschop, 2000; Lawrence and Fowler, 2002) the quality of realimentation diet and duration of re-feeding.

Feed restriction not only affects the growth performance but also the serum bio-chemical profile. The present study was planned to study the effect of feed restriction followed by realimentation on the serum biochemical parameters in ram lambs.

Materials and Methods

The growth and digestion trials were carried out at the Livestock Research Station, Garividi, Andhra Pradesh and blood chemical analysis at Animal Nutrition laboratory at NTR College of Veterinary Science, Gannavaram. The chemical composition of feed ingredients was determined (AOAC, 2007) and the cell-wall constituents by Van Soest *et al.*, (1991). In addition to the trials, other blood chemical parameters were also estimated. HDL-C was estimated using diagnostic kit (M/s. Span Diagnostics Private Limited) following the PEG precipitation and enzymatic method of Weibs and Smith (1985).

Serum total proteins were estimated by using diagnostic kit (M/s. Span Diagnostics Private Limited) following modified Biuret method. The serum albumin was estimated by using diagnostic kit (M/s. Span Diagnostics Private Limited) using the bromocresol green (BCG), end Point assay method.

The experiment was carried out for a period of 8 weeks and 4 weeks for restricted and re-alimentation, respectively, in a CRD model. A 12 week growth trial (8 weeks restriction phase and 4 weeks re-alimentation phase) was conducted using 32 ram lambs (ave. 3 months age) randomly divided into 4 groups with 8 lambs in each group and was allotted to one of the following dietary regimes in which feed restriction was followed at 4 levels *viz.*, 0% (control; T₁), 10 % (T₂), 20% (T₃), 30% (T₄) level. Restricted phase was followed for 8 weeks followed by re-alimentation phase for 4 weeks. Body weights were recorded at weekly intervals.

All the sheep were housed in groups in 4 different sheds and are fed under intensive system (ICAR, 2013). All the animals were fed with Subabul leaves as green fodder *ad libitum*.

During the last 7 days of the trial in both restriction phase and re-alimentation phase, digestibility trial was conducted. The data was subjected to one – way classification of analysis of variance (Snedecor and Cochran, 1989) and the means were tested by least significant difference.

Results and Discussion

Influence of feed restriction on blood serum parameters

The serum cholesterol increased linearly from T1 to T4 with the increasing levels of feed restriction and it was higher (P<0.05). Same trend was (Table 1) observed from serum albumin but was non-significant. The same results were obtained for the parameters serum albumin and HDL cholesterol. However the trend was reverse with serum total proteins as it was higher for T1 and non-significant. During realimentation phase, the serum cholesterol was highest (P<0.05) for T1 as compared to other treatments. Similar results were observed for T1 (P<0.05) for total proteins and HDL Cholesterol. Both the values were higher for T1 as compared to other groups. The other parameters like albumin and globulin were comparable among treatments.

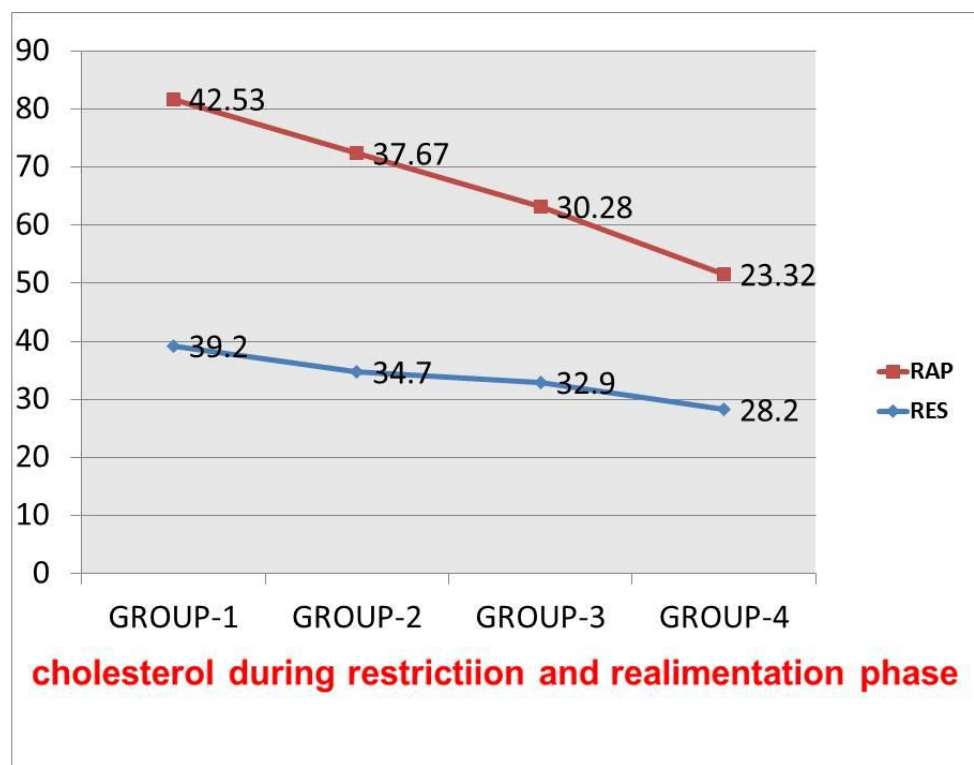
Restriction phase

Significant differences were found between dietary nutrient entry and the concentration of blood metabolites. During restriction phase, as the level of restriction increased and the values of serum total proteins decreased mainly due to the decrease in globulin concentration. These results are in agreement with Abdalla (2014) who reported that values of serum total protein were decreased (P<0.05) in sheep and goats due to restricted feeding, mainly due to a decrease in globulin levels of the feed restricted animals.

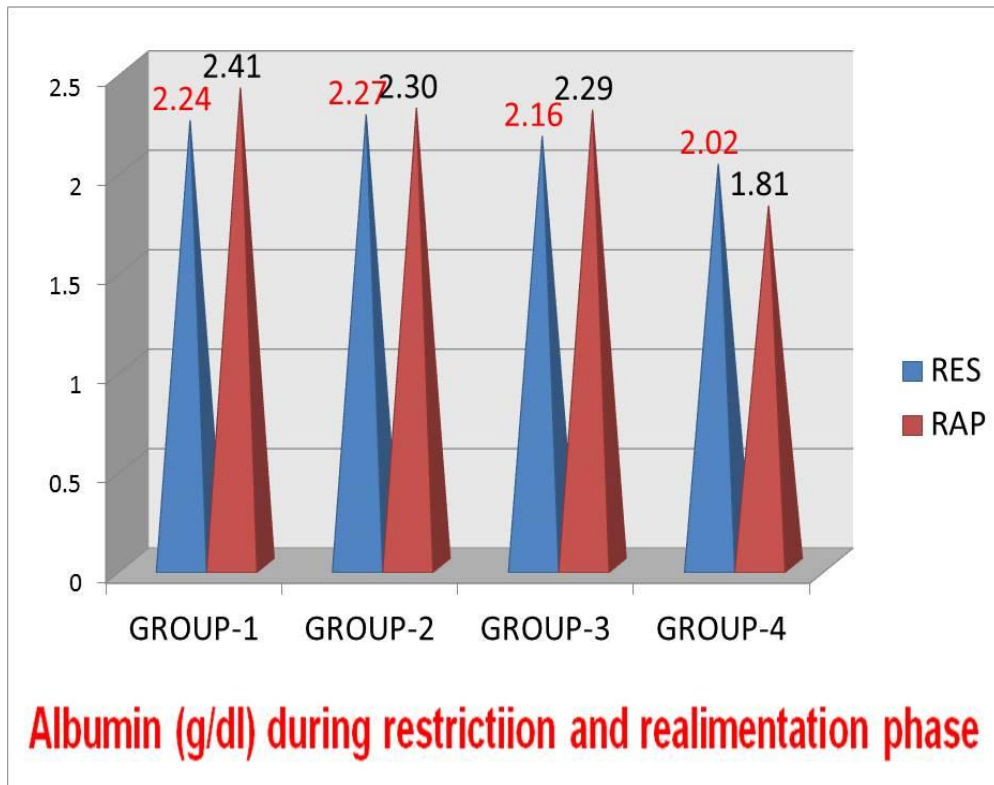
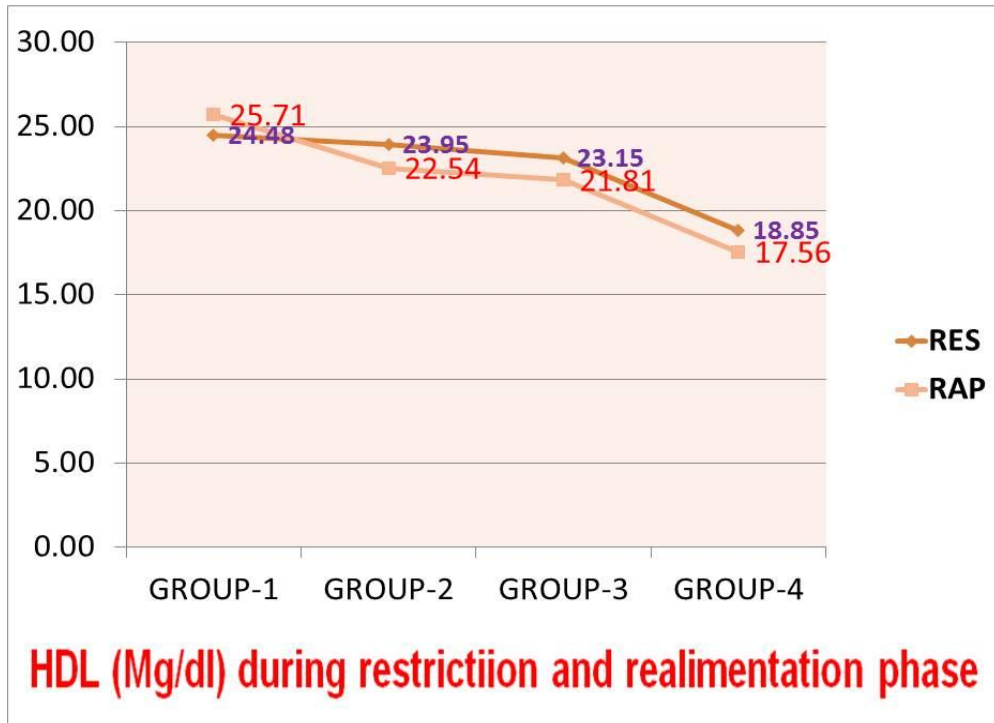
Table.1 Influence of feed restriction during restriction phase among the treatments

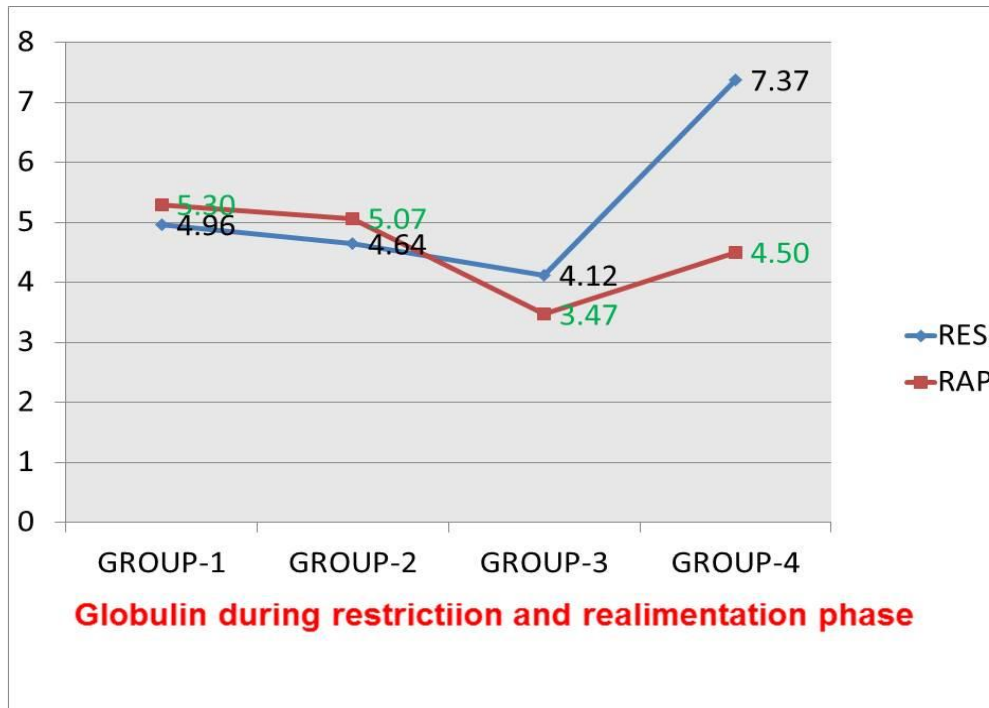
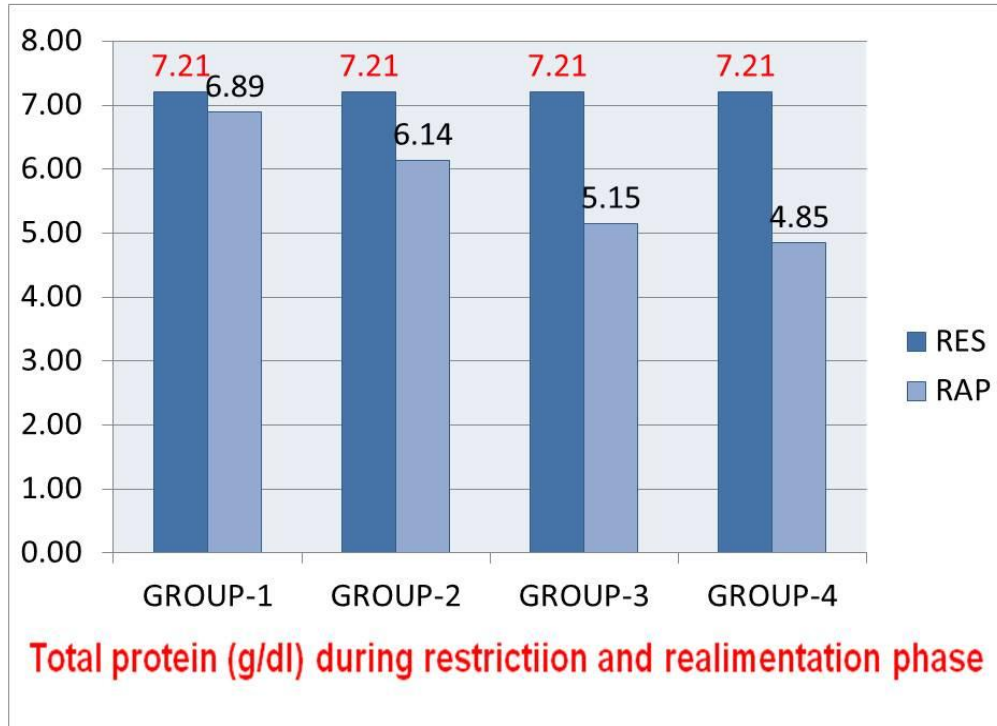
Particulars	T ₁	T ₂	T ₃	T ₄
Total protein (g/dl)	7.2±0.4	6.9±0.5	6.2±0.7	5.6±0.3
Albumin (g/dl)	2.44 ±1.0	2.02±0.2	2.16±0.2	2.27±0.2
Globulin (g/dl)	4.9±0.34	5.3±1.4	4.1±0.7	4.6±0.6
Cholesterol (mg/dl)*	28.2 ^b ±2.1	34.7 ^a ±1.9	32.9 ^a ±1.7	39.2 ^a ±3.0
HDL (mg/dl)	21.8±2.2	23.1±1.3	23.9±1.7	24.4±1.0
Albumin concentration (g/dl)	22.4±1.4	20.2±1.6	21.6±2.5	22.7±2.6
Influence of feed restriction during Realimentation Phase among the treatments				
Total protein (g/dl)*	6.9 ^a ± 0.32	6.1 ^a ± 0.3	5.2 ^b ± 0.3	4.9 ^b ± 0.2
Albumin (g/dl)	2.4 ± 0.2	2.3 ± 0.2	2.9 ± 0.1	1.8 ± 0.2
Globulin (g/dl)	4.5 ± 0.5	3.8 ± 0.5	2.9 ± 0.4	2.6 ± 0.4
Cholesterol (mg/dl)*	42.54 ^a ± 1.6	30.3 ^b ±1.5	23.3 ^b ± 3.0	37.7 ^a ± 2.6
HDL (mg/dl)*	25.7 ^a ± 1.1	22.5 ^a ± 1.7	21.8 ^a ± 1.3	17.5 ^b ± 0.9
Albumin Concentration (g/dl)	24.1 ± 2.4	23.0 ± 2.2	22.9 ± 1.7	18.1 ± 2.3

^{ab} values in a row with different superscripts differ significantly *(P<0.05)



Graph depicting the influence of feed restriction on serum bio chemical profile during restriction and re-alimentation phase among the treatments





They also found that albumin increased insignificantly in sheep and remained almost same in goats. But in contradiction, in the present study, the albumin levels decreased as feed restriction increased.

Restricted feeding among the groups showed increased ($P < 0.05$) serum lipid concentration especially, cholesterol. The cholesterol concentration was 15.3, 5.3 and 3.9 percent more for T₂, T₃ and T₄, respectively as

compared to T₁. Similar trend was also observed by Abdalla, (2014) who reported significant increase in serum cholesterol level in sheep maintain the restricted feed, The case in the present study was that the experimental animals exposed to restricted feeding has no other chance to increase that metabolic rate except to go for catabolism of the tissues.

Re-alimentation phase

The application of feed restriction decreased feed ingestion and consequently serum levels of nutrients did not damage the micro flora. However, after starting normal re-alimentation, the animals subjected to feed restriction showed more intensive growth that would have been occurred if they have continuous growth. In the present findings, it was observed that the maximum feed restricted group had higher (P<0.05) serum cholesterol and the remaining parameters like albumin, HDL, total protein, globulin showed a slow pick up from T₁ to T₄, respectively.

However, these conditions are based on severity and duration of restriction (Neto *et al.*, 2011; Val keners *et al.*, 2004; Yan *et al.*, 2007). Further re-alimentation studies have to be under taken for longer periods to confirm the above fact.

It was concluded that feed restriction and realimentation has a considerable effect on the serum biochemical parameters. The increase in the feed restriction up to 30% diet resulted in decreased serum albumin, total albumin, globulin, albumin concentration and cholesterol content and increase the HDL content in ram lambs. Cholesterol and HDL

(mg/dl) were the parameters highly affected (P<0.05) during the study while the albumin concentration remains mostly unchanged.

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