

**COMPARISON OF TRANSAMINASES ACTIVITY  
 IN BOTH RUMEN FLUID AND BLOOD SERA  
 OF SHEEP FED DIFFERENT FIELD STUBBLES  
 (An Experimental Study)  
 (With 8 Tables)**

By

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مقارنة بين النشاط الأنزيمي للترانس أمينيز في كل من سائل الكرش  
 ومصل الأغنام المغذاة على بعض المخلفات الحقلية  
 (دراسة تجريبية)

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أجريت الدراسة على عدد 15 من النعاج البلدي في 3 مجموعات مختلفة - خمسة في كل مجموعة - أعطيت ثلاث أنواع من بعض المخلفات الحقلية لهذه المجموعات أخذت عينات من سائل الكرش وكذا عينات دم على ثلاث مرات - مرة كل عشرة أيام، تم تحليل النشاط الأنزيمي لكل من الأسبرتات أمينوترانسفيريز والألاني-أمينوترانسفيريز في كل من سائل الكرش ومصل الدم في كل مرة ، وتلخصت النتائج في أن نشاط أنزيم الأسبرتات أمينوترانسفيريز في الدم تناقص في المجموعات الثلاثة بعد 20 ، 20 ، 20 يوم على التوالي من بدء التجربة بينما تناقص فقط في سائل الكرش في المجموعة الثالثة عند اليوم العشرون والثلاثون من بداية التجربة . وكان هناك نقصا معنويا في المجموعات الثانية والثالثة بالنسبة لمصل الدم والمجموعات الأولى والثانية بالنسبة لسائل الكرش . وبالنسبة لأنزيم الألانين أمينوترانسفيريز فلم تكن هناك تغيرات ملحوظة في مصل الدم بين المجموعات وكذا في السرات المختلفة لأخذ العينات وأما في سائل الكرش فقد كان هناك فروق معنوية بين المجموعات الأولى والثالثة والأولى والثانية على التوالي كما أنه لم يكن هناك ارتباطا بين نشاط هذه الأنزيمات في كل من مصل الدم وسائل الكرش إلا أنه وجد ارتباطا سلبيا في أنزيم الألاني-أمينوترانسفيريز في مصل الدم ونظيره في سائل الكرش في المجموعة الثانية عند اليوم العشرين من بدء التجربة . وتجدر الإشارة إلى أن نشاط هذه الأنزيمات في سائل الكرش لا يعتبر مؤشرا على نشاط مثيلاتها في مصل الدم .

**SUMMARY**

The study was conducted on 15 balady ewes in three groups, 5 in each group. Three different rations were given for the three groups. Rumen juice and blood serum samples were drained three times from each animal with 10 days intervals. Activities of AST and ALT enzymes in these samples

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were determined. The study revealed that aspartate aminotransferase (AST) was decreased significantly in blood serum at the second and third time of sampling in ewes fed green onions (group II) and those given green broad beans stems (group III) and in the ruminal juice of ewes fed sugar can straw (group I) and those of group II. ALT showed only an increased activity in blood serum in the second time of sampling in group II and in the third time of sampling in group I, but ruminal juice showed only an increased activity in group I at the third time of sampling and in group III at the second time of sampling. A negative correlation between ALT activity of blood serum and that of ruminal juice at the second time of sampling in group II was only recorded. It could be concluded that the activity of transaminases in ruminal juice is not an indicative for their respective activity in blood serum.

### INTRODUCTION

The only available evidence that transaminase activity exists in rumen fluid has been previously stated by OTAGAKI *et al.* (1955). The influence of feed and time of sampling on the transaminase activity in rumen fluid was previously studied by REKIB and SADHU (1968).

The present experiment aimed to study the transaminase activity of the rumen fluid under different feeding regimes. Comparison between the activities of alanine aminotransferase (ALT) and aspartate aminotransferase (AST) in both rumen fluid and their respective blood sera was also attempted.

### MATERIAL and METHODS

Fifteen balady ewes, three to five years old constituted the material of the study. Pre-experimental period extended for 10 days and the whole experiments extended for 40 days. Animals were divided into three groups, with five ewes in each group. Ration given, regime of feeding, scheme and time of sampling are shown in table 1.

Collected rumen juice samples were sieved through three layers of gauze to obtain clear filtrate. Blood sample, from each respective animal was drawn just before rumen juice sampling. Blood was also left to coagulate, then centrifuged to obtain clear serum.

Both rumen juice filtrate and blood serum samples were immediately analysed for ALT and AST activities by using testkits supplied by Boehringer Mannheim AG, Germany. The concentration of AST and ALT activities was determined colorometrically at 600 nm. The obtained data were statistically analysed by means of a computer program (SAS) to obtain X, S.D., ANOVA and correlation analysis.

## TRANSAMINASES, RUMEN FLUID &amp; BLOOD SERA

**RESULTS**

The enzyme activities, both in blood serum and rumen filtrate, varied greatly depending on the diet fed to the animal and the time of sampling (Tables 3 & 4). Activity of AST is in general- higher in serum samples than ruminal juice samples while the reverse was true for ALT activity.

Statistical analysis of the obtained data revealed the following results:

**I- ALT activity:****a- In blood serum:**

There were non significant differences ( $P > 0.05$ ) in blood serum ALT activity between the three groups of animals. Non significant differences ( $P > 0.05$ ) were also observed at the different times of sampling.

**b- In ruminal filtrate:**

There was a significant difference ( $P < 0.01$ ) in ALT activities in ruminal filtrate between groups I & II and group I & III (Table 6), while no significant differences ( $P > 0.05$ ) were observed in ALT activity at different times of sampling in all groups (Table 5).

**II- AST activity :****a- In blood serum :**

There significant decrease ( $P = 0.001$ ) in AST activity of blood serum in groups II & III in comparison with group I (Tables 3 & 6). Significant decrease ( $P = 0.001$ ) was existed in the mean values of AST activity in serum at 20th day when compared with the corresponding values at 10th day (Table 6).

**b- In rumen filtrate:**

A significant decrease ( $P < 0.001$ ) was observed in the mean values of AST activity in rumen filtrate in groups I & II than group III. Similar significant decrease ( $P < 0.001$ ) was found in AST activity values of rumen filtrate at 20th & 30th day of sampling (Table 7). The correlation analysis indicated only a significant negative correlation ( $r = -0.84$ ) between ALT activity of blood serum and that of rumen filtrate at 20th day of sampling in group II (Table 8).

**DISCUSSION**

Available literature lacks adequate informations about variations of transaminase activities in rumen juice under various feeding regimes. Comparison between the activities of tested enzymes in both blood serum and rumen fluid filtrate samples was also tried. Statistical analysis of the obtained data was performed to evaluate the effect of both ration and period of sampling upon the rate of transamination. There was a general tendency for serum values of AST activity to decrease with elongation of sampling period (table 3): Thus higher values were recorded at 10th day post feeding of all rations offered to the animals while these values were decreased at 20th day post

**A.A. DAKKA et al.**

feeding and re-elevated again at the 30<sup>th</sup> day post feeding in groups II & III. For group I, AST activity level continued to decrease. With regard to rumen juice values, AST activity level recorded the highest values at 10<sup>th</sup> day post feeding for all groups, but such values began to decrease in samples at 20<sup>th</sup> day post feeding in groups II & III. These levels re-elevated again at the 30<sup>th</sup> day post feeding in rumen juice samples. Data for group I behaved a different pattern. So at 20<sup>th</sup> day post feeding samples, the level of AST activity was higher than at 10<sup>th</sup> day post feeding samples, while the values at 10<sup>th</sup> day post feeding were the lowest recorded in this group.

Values for serum AST activity in groups II & III behaved a regular pattern (table 3). So the level was increased from 10<sup>th</sup> day to 20<sup>th</sup> day of sampling then decreased, to nearly the 10<sup>th</sup> day samples, at the 30<sup>th</sup> day samples. For group I the lowest serum ALT activity values were recorded at 20<sup>th</sup> day samples while the maximum values were recorded at the 30<sup>th</sup> day samples.

For rumen juice ALT activity values for each group behaved a special trend. Where in group II the level was progressively positively increased with the period of sampling, while for group III a nearly steady rumen juice ALT activity level was recorded irrespective to period of sampling.

Values for rumen juice ALT activity in group II were increased from the 10<sup>th</sup> to the 20<sup>th</sup> days post feeding but these values dropped again at the 30<sup>th</sup> day post feeding, but they were still higher than the 10<sup>th</sup> day post feeding sample (table 4).

A significant negative correlation ( $r = -0.84$ ) between ALT activity of blood serum and that of rumen filtrate at 20<sup>th</sup> day of sampling in group II was only recorded (table 8). The non significant correlation between the activity of AST and ALT in both blood serum and rumen juice samples in all groups and at different periods of sampling indicated that ruminal juice enzymic activities could not be used as an indicator for enzymatic changes in blood serum in sheep.

**REFERENCES**

- Otagaki, K.K.; Black, A.L.; Goss, H. and Kleiber, M. (1955): *J. Agric. Fd Chem.* 3, P. 948. cited by Rekib and Sadhu (1968).  
 Rekib, A. and Sadhu, D.P. (1968): Transaminase activity in the rumen liquor of sheep. *Br. J. Nutr.* 22, P. 325.

## TRANSAMINASES, RUMEN FLUID &amp; BLOOD SERA

Table 1: Ration, regime of feeding, scheme and time of sampling for the different groups of ewes used in the study.

groups	Ration	Regime of feeding	Interval between samplings	Time of sampling post feeding
I	Sugar cane straw	ad libitum	10 day	5 hours
II	Green onion, s stems	ad libitum	10 day	5 hours
III	Green broad beans stems	ad libitum	10 day	5 hours

Table (2) Chemical composition of the experimental rations.

Ration	Protein	Fat	Carbohydrate	Fiber	Ash	Moisture
Sugar cane straw	1.20	1.33	61.47	30.60	5.40	9.10
Green onion, s stem	13.12	8.00	54.89	21.66	2.33	89.90
Green broad bean, s stem	6.60	4.00	33.40	48.00	8.00	80.00

Table (3) Blood serum and ruminal juice Aspartate aminotransferase activity levels (AST- U/L).

Group	Blood serum			Ruminal juice		
	Time post feeding (days)					
	10	20	30	10	20	30
I	83.44 ± 21.96	40.26 ± 7.97	26.30 ± 4.41	9.20 ± 1.25	13.92 ± 6.71	8.62 ± 3.80
II	48.83 ± 13.33	15.62 ± 6.53	24.20 ± 6.72	20.33 ± 4.67	13.00 ± 4.30	20.22 ± 5.97
III	40.83 ± 7.81	18.90 ± 15.53	23.54 ± 6.61	58.42 ± 25.35	15.62 ± 6.58	22.90 ± 6.19

Table (4) Blood serum and ruminal juice Alanine aminotransferase activity levels (ALT- U/L).

Group	Blood serum			Ruminal juice		
	Time post feeding (days)					
	10	20	30	10	20	30
I	3.82 ± 1.53	2.10 ± 0.60	6.12 ± 2.63	4.00 ± 1.55	9.52 ± 4.07	12.88 ± 2.17
II	2.74 ± 1.33	6.68 ± 2.37	3.06 ± 1.08	10.33 ± 1.57	10.92 ± 0.66	10.80 ± 1.47
III	3.77 ± 1.58	5.60 ± 1.75	3.44 ± 1.75	10.55 ± 5.37	17.14 ± 6.57	13.30 ± 2.24

## A.A. DAKKA et al.

Table (5) Analysis of variance for the obtained data of ALT (ruminal juice)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	413.2083889	103.3022222	4.65	0.0036
GROUP	2	332.6671111	166.3335556	7.48	0.0017
DAY	2	80.5417773	40.2708889	1.81	0.1755
Error	40	889.0475556	22.2261839		
Corrected Total	44	1302.2564444			
	R-Square	C.V.	Root MSE		ALTR Mean
	0.317302	41.60639	4.714466		11.3311111

Table (6) Analysis of variance for the obtained data of AST (blood serum)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	15054.48712	3763.62178	21.22	0.0001
GROUP	2	5934.98476	2517.49238	14.20	0.0001
DAY	2	10019.50236	5009.75118	28.25	0.0001
Error	40	7093.37580	177.33439		
Corrected Total	44	22147.86292			
	R-Square	C.V.	Root MSE		ASTB Mean
	0.679726	38.02091	13.31670		35.0246667

Table (7) Analysis of variance for the obtained data of AST (ruminal juice)

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	4	4708.294222	1177.073556	7.43	0.0001
GROUP	2	3244.600444	1622.300222	10.24	0.0003
DAY	2	1463.693778	731.346889	4.62	0.0157
Error	40	6339.748889	158.493722		
Corrected Total	44	11048.043111			
	R-Square	C.V.	Root MSE		ASTR Mean
	0.426165	64.77525	12.58943		19.4355556

Table (8) Correlation analysis between values of ALT as well as AST values in both blood and ruminal juice.

Variable	ALT (B) and ALT (R)			AST (B) and AST (R)		
	10	20	30	10	20	30
days groups						
Group 1	-	-	-	-	-	-
Group 2	-	-	-	-	-	-
Group 3	-	-	-	-	-	-