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EFFECT OF DIETARY INCLUSION OF CLINOPTILOLITE ON THE PREVENTION OF SUB ACUTE RUMEN ACIDOSIS IN DAIRY COWS

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INTRODUCTION .

- Sub acute rumen acidosis (SARA) is characterized by ***repeated*** periods of depressed ruminal pH≤5.5-5.6.

- Main causes ➥ Diets ***rich*** in fermentable carbohydrates
  ➥ ***Poor*** in cellulose
  ➥ Administered ***without*** prior appropriate adjustment of the microbial flora

- Zeolites are microporous crystalline solids with well-defined structures. Generally, they contain *silicon, aluminium* and *oxygen* in their framework and *cations, water* and/or other molecules within their pores.

- Inclusion of zeolites in cow rations has **positive** effects on preventing SARA by:

✓ increasing pH values and

✓ affecting volatile fatty acids concentration.

- **Clinoptilolite** is a *natural* zeolite that has been approved by the EU (European Commission Regulation No. 2200/2001) as a binder and coagulant agent for use in *bovine, pig, poultry, rabbit* and *salmon feedstuffs* (max. 20g/kg of complete feedstuff).

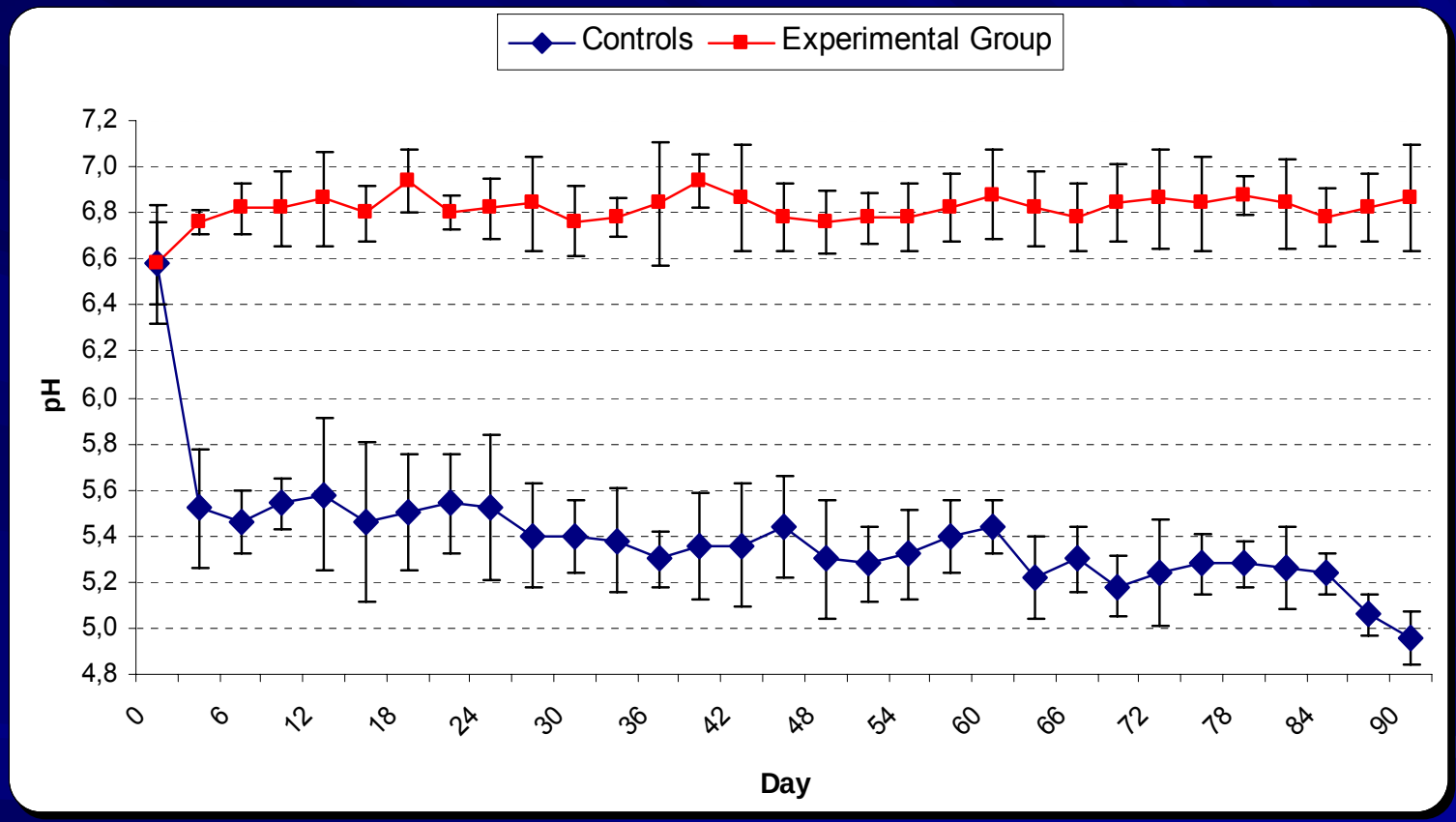
MATERIALS & METHODS .

- In this study 10 clinically healthy Holstein cows (3-6 years old) in dry season and not pregnant were used.
- A permanent external fistula of the rumen was created by a veterinarian surgeon.
- All animals were administered a Sara-causing diet : Wheat pellets and barley in 20% additional quantity over the standard diet.

- 1st group (n=5) ➥ concentrate mixture supplemented with 200g/cow/day of clinoptilolite.
- 2nd group (n=5) ➥ controls.
- Experiment lasted 90 days. Every 3 days, 5 h. after feeding, (except d. 0), ruminal fluid and blood were sampled.
- Daily clinical examination, possible diarrhoea grading were conducted, while feed intake was ensured.
- The clinoptiloforic material used contained 92% clinoptilolite and its cation exchange capacity was 200 mEq/100g.

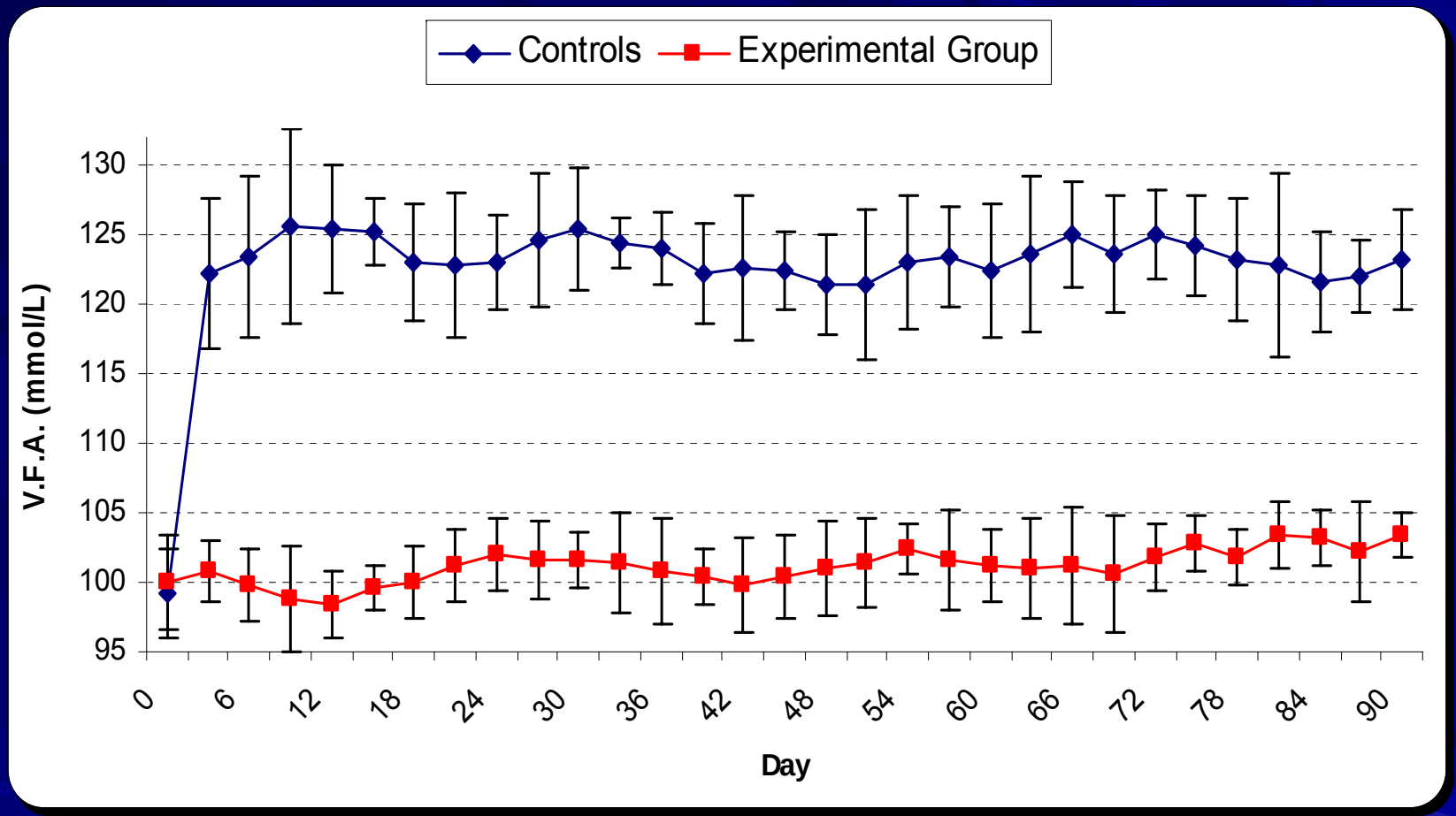
RESULTS .

Ruminal pH



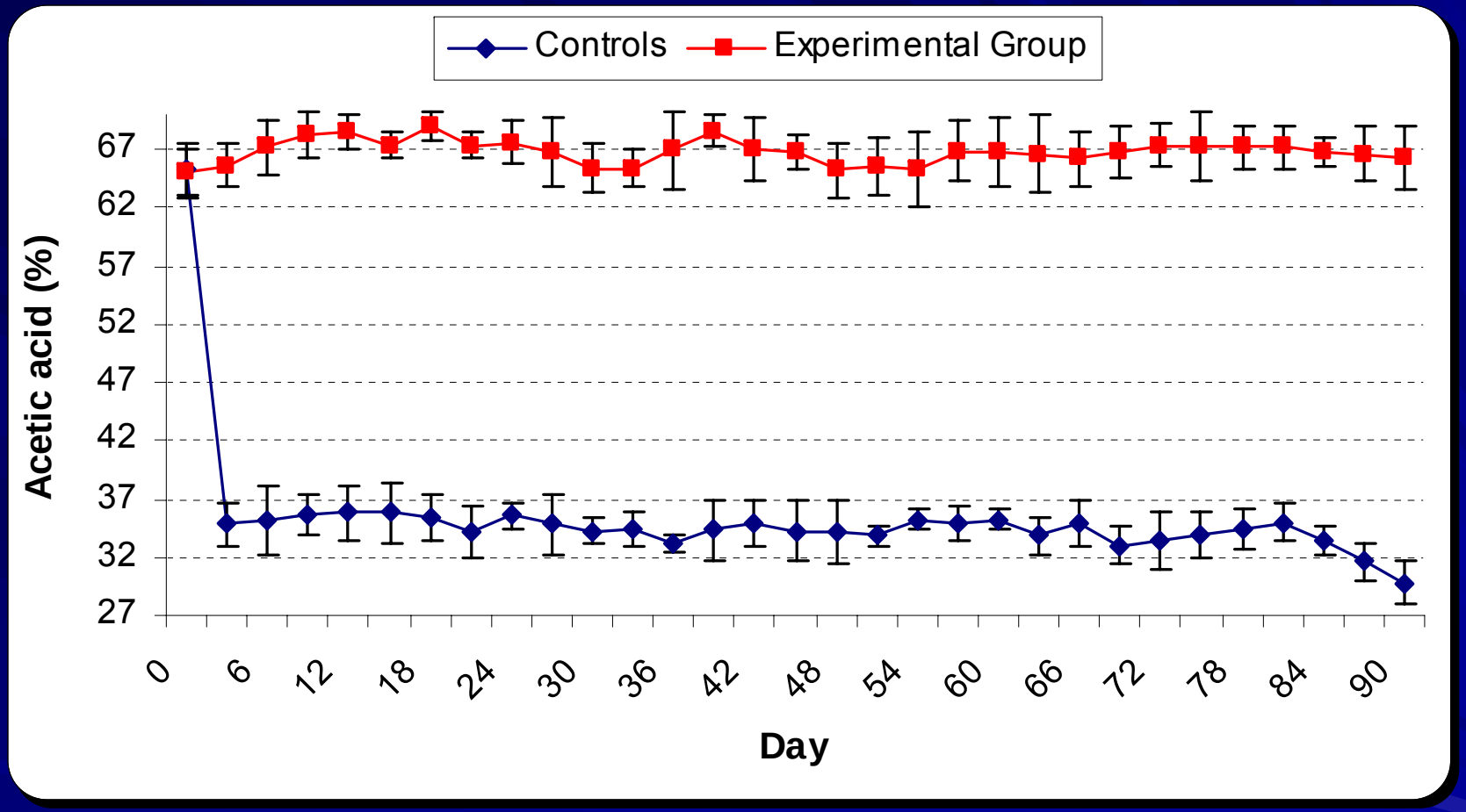
Ruminal fluid pH was 4.96-5.52 in control group, ***significantly lower*** ($P \leq 0.05$) than 6.76-6.94 in experimental group.

V.F.A.s



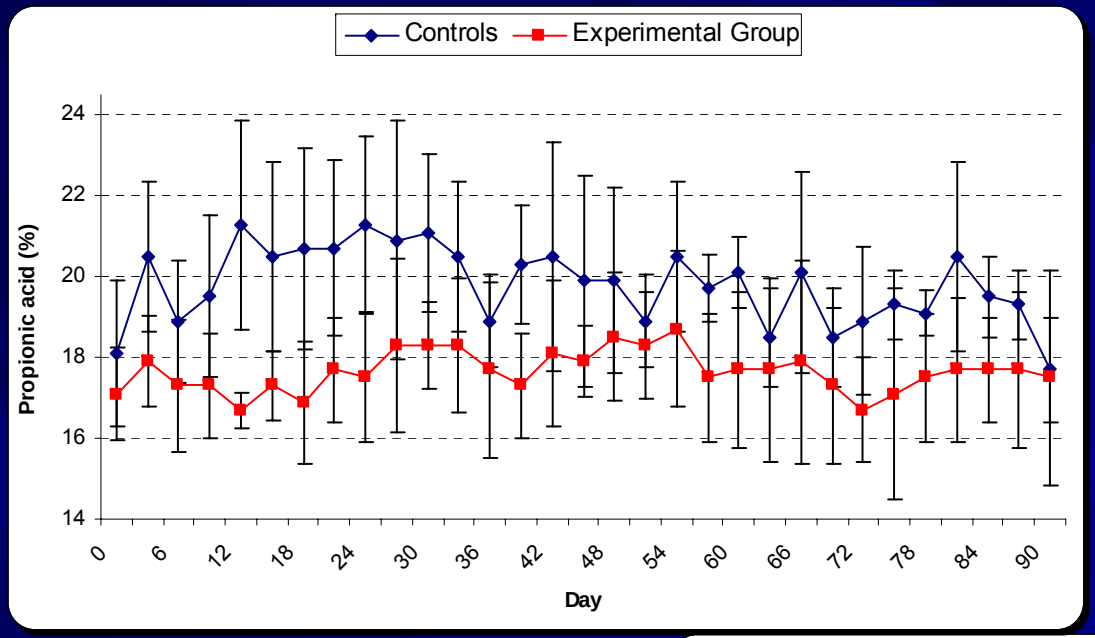
V.F.A. concentration was ***significantly higher*** ($P \leq 0.05$) in controls, while it remained stable in experimental group.

Acetic acid

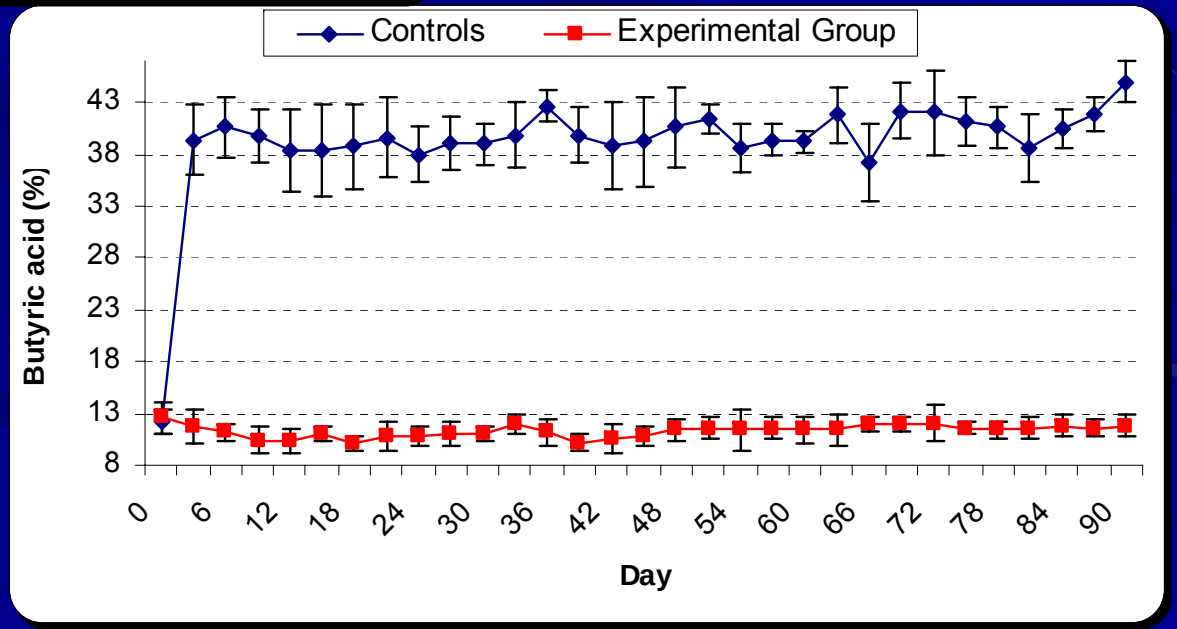


% ratio of acetic acid was ***significantly lower*** ($P \leq 0.05$) in control group.

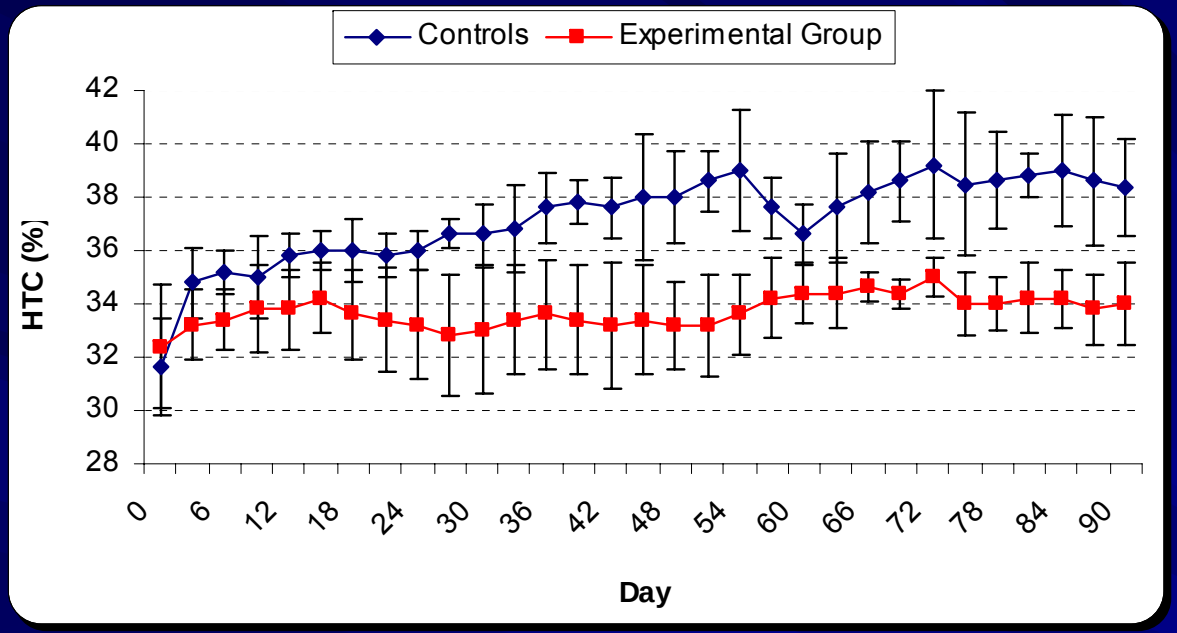
Propionic & Butyric Acid



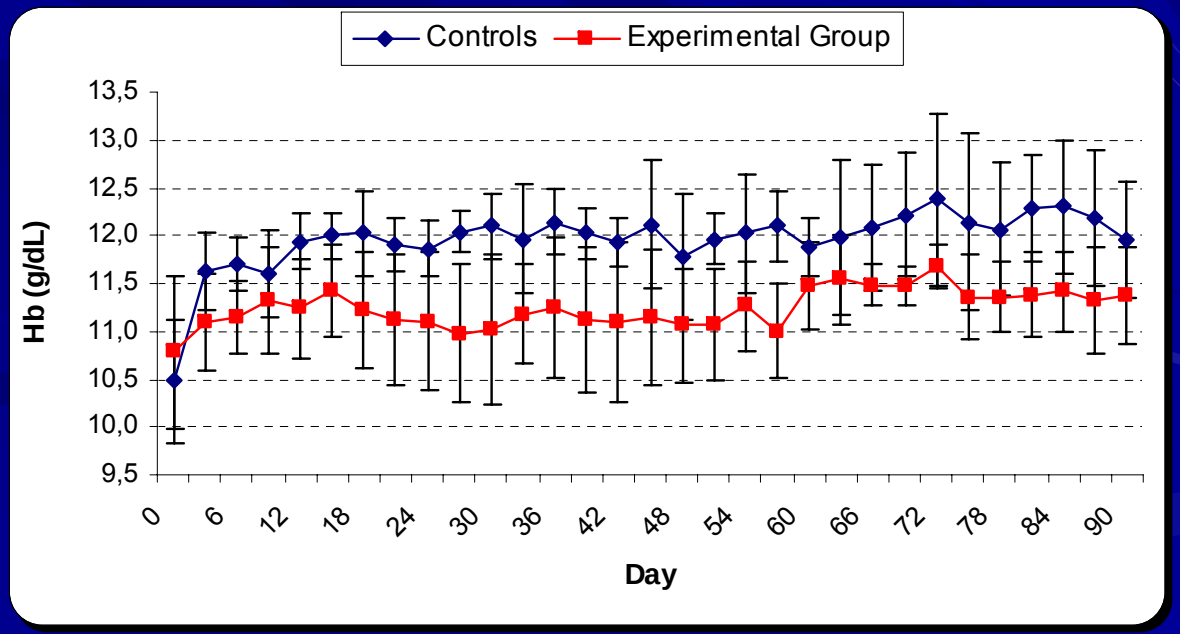
% ratio of propionic and butyric acid was ***significantly higher*** ($P \leq 0.05$) in control group.



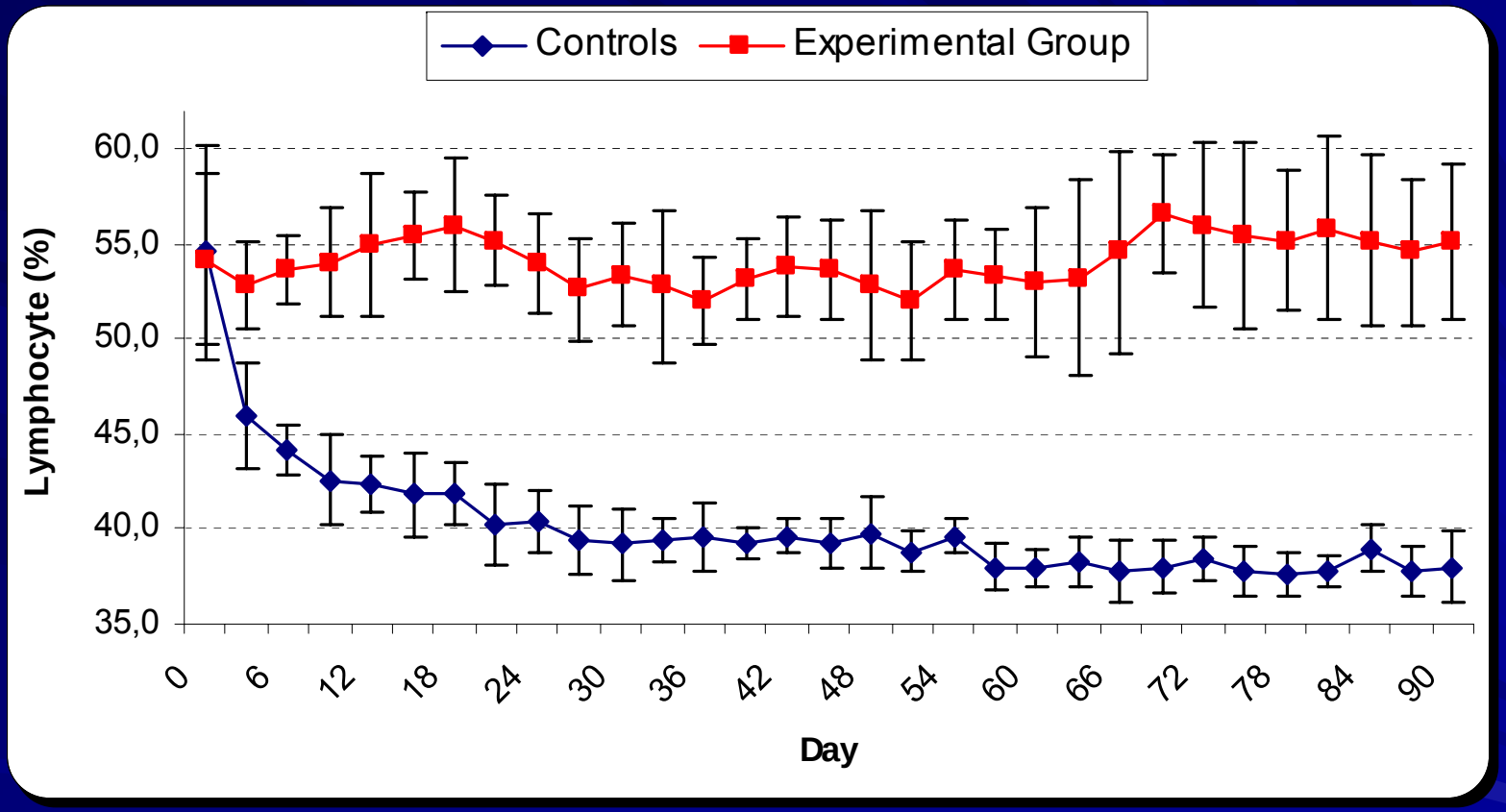
Hematocrit & Hemoglobin



Hematocrit & Hemoglobin levels were ***significantly higher*** ($P \leq 0.05$) in control group.

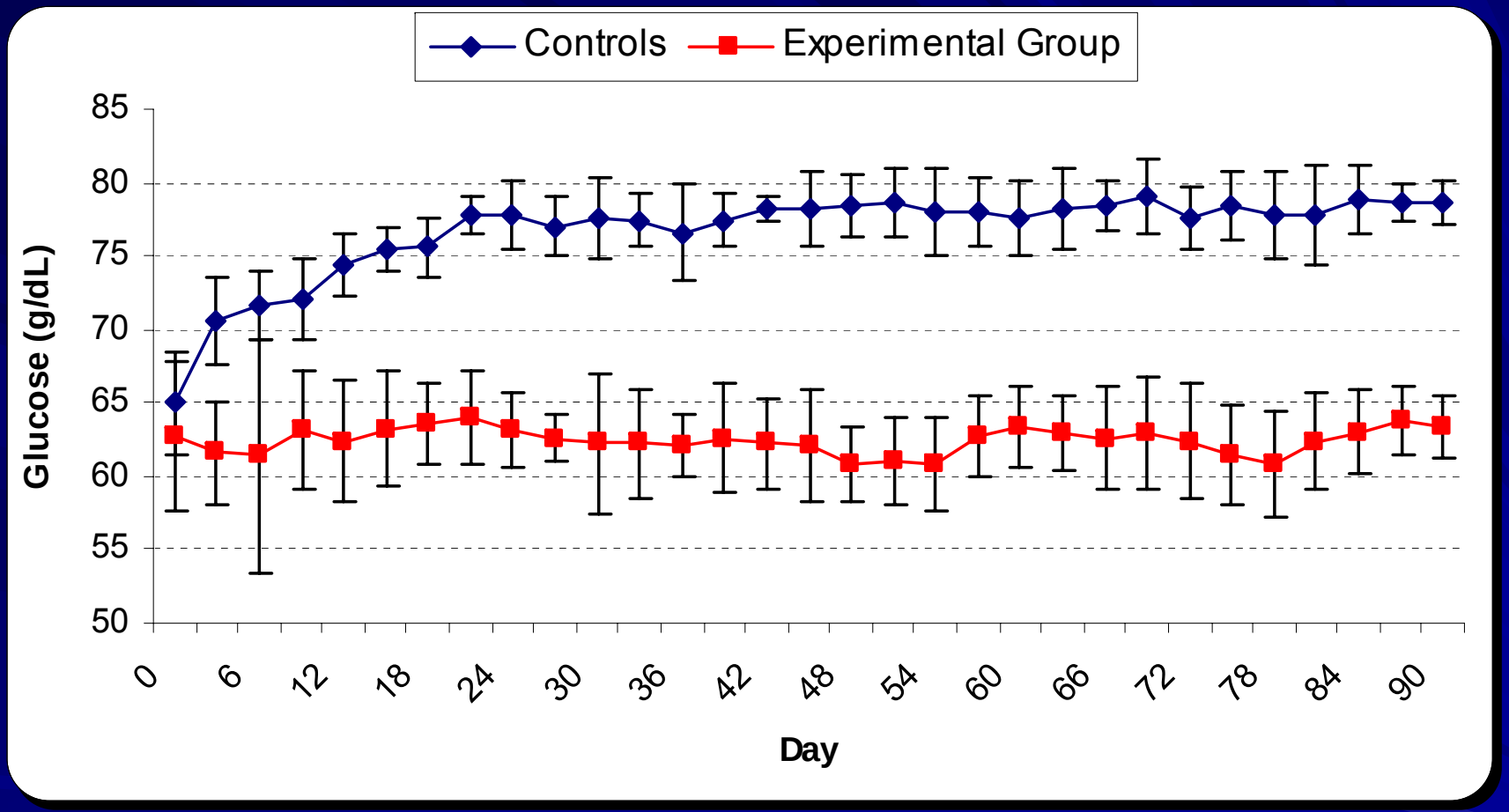


White blood cell count, neutrophil granulocyte & lymphocyte percentage



White blood cell count and neutrophil granulocyte levels were ***significantly higher*** ($P \leq 0.05$) in control group, while lymphocyte % ***decreased***.

Glucose, β-HBA & Acetoacetic acid



Glucose, β-HBA & Acetoacetic acid levels were ***significantly higher*** ($P \leq 0.05$) in controls, while they were stable in the experimental group.

CONCLUSIONS

- The presence of clinoptilolite in the experimental group prevented the pH decrease acting as a regulatory agent, leading to stable VFA levels.

- Stability in % ratio of acetic, propionic and butyric acid in the experimental group is attributed to stable pH values, due to clinoptilolite's regulatory action.

- Stability of HTC in experimental group, is due to stable pH values and VFAs concentration, while it's increase in controls is attributed to dehydration and increased saliva production because of elevated VFA production and low pH values.

- The increase of Hb is a result of dehydration, neutrofil and WBC levels in controls and lymphocyte decrease is attributed to inflammation in rumen mucosa because of elevated VFA concentration.

- Stable levels of glucose, β-HBA and AcAc remained in the experimental group due to regulatory action of clinoptilolite while they increased in control group due to elevated levels of propionic acid, butyric acid and β-HBA, respectively.

THANK YOU FOR YOUR ATTENTION!