

## ABSTRACT

### TOPIC: ASSESSMENT OF STARTER CULTURE POTENTIALS OF NATURALLY OCCURRING LACTIC ACID BACTERIA FROM THE RUMEN OF ANKOLE LONGHORN CATTLE

**Background:** Starter cultures are selected microbial preparations with relatively large number of microbial cells that has a single type or mixture of microorganisms that are intentionally added in the food to initiate and increase efficiency of fermentation processes.

Lactic acid bacteria are fermentative bacteria that belong to a group of Gram-positive bacteria characterized by increased tolerance to acidic environment and release of lactic acid as their end-product of fermentation process.

**Objective:** The study was to develop starter cultures that will contribute towards improvement of the quantity and quality of fermented dairy products in Uganda.

**Methods:** Across section laboratory based study was done, selective purposive sampling of Ankole calves was used to identify 10 calves where rumen samples were going to be collected. Aseptic sample collection techniques were used to collect rumen samples, they were transported on ice to Mbarara Zonal Agriculture and development institute Laboratories for bacteria isolation. Samples were cultured anaerobically on LAB selective media MRS and M17 agars, incubated at 37°C for 72hrs. LAB species were identified basing on colony morphology, shape, color, gram stain reactions and Biochemical tests. DNA was extracted using CTAB method. Whole Genome Sequencing was carried out to detected Antimicrobial Resistance Genes. Agar over lay method was used to determine antimicrobial activity of selected LAB strains.

**Results:** Out of 10 cultured rumen samples, 7 were able to show growth of LAB species. Most isolated LAB species were Streptococcus 45%, Lactobacillus 44%, and Lacto coccobacilli 11%. Only 3 strains (ST1, LB3, LB10) were able to ferment UHT milk at a temperature of 37°C to achieve a pH of 4 in less than 10h of incubation. The most common identified antibiotic resistance genes were conferring resistance to quinolones and fluoroquinolones (*gyr A*, *gyr B*), Sulfonamide (*folP*) Trimethoprim (*folA*, *Dfr*) Efmamycin (*EF- Tu gene*), Fusidic Acid (*EF- G*) Isoniazid (*kasA*) Fosfomycin (*MurA*), Rifampicin (*rpoB*), Streptomycin (*S12*, *gidB*), Tylosin (*RImA*) and Vancomycin (*MprF*). All were intrinsically located. Only 2 LAB strains (LB3 and LB 10) showed antimicrobial activity against enteropathogenic bacteria (*E. coli* and *Staphylococcus aureus*).

**Conclusion:** ST1, LB3 and LB10 exhibited high potentials of being used as starter cultures in the fermentation of dairy products with antimicrobial effects exhibited by LB3 and LB10.

**Recommendations:** Further research is still needed in purification, characterization and optimization of antimicrobial peptides produced by isolated LAB strains to be used as probiotics.