Short communication

Quantitative and Qualitative Improvements in DNA Extraction Procedures Using a Bronopol™ Tablet in Alpine Goat Milk

Ashley Newton, Amber L. Martin, Yonathan Tilahun*, and Steve Zeng.

American Institute for Goat Research at Langston University, Langston, OK 73034, US.

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ABSTRACT

Preservation of milk is important as it relates to *Capra aegagrus hircus* (Alpine goat) milk DNA extraction. We examined the difference in concentration and quality of DNA resulting from the use of a preservation tablet (Bronopol™) versus a preservation solution by Norgen Biotek. When examining the concentration and quality of DNA in goat milk for studies using somatic cells from goat milk, it is ideal to use a substance that has a long-term preservation potential. The concentrations and quality of DNA obtained from goat milk was compared. Two separate trial samples of Alpine goat milk were obtained. The preservation tablet commonly known as B-14 or Bronopol™ was dissolved into one sample of milk. Another sample of goat milk without a tablet used a preservation solution from a Norgen Biotek. All DNA extraction methods followed the Norgen Biotek Corp. manufacturer's protocol. DNA quantity and quality was analyzed using a Thermo Scientific NanodropLite spectrophotometer. The study showed that the traditional Bronopol™ was a better method of preserving and maintaining the integrity of DNA in the somatic cells that are present in Alpine goat milk. This is based on the results obtained following determination of quantity and A260/A280 readings for quality assessment. Thus, the use of Bronopol™ is the preferred method of preserving goat milk for DNA extraction.

1. Introduction

Alpine goat milk contains a community of somatic cells associated with the mammary glands of the milk goat. The somatic cells are important indicators for things such as identifyng the presence of mastitis in the goat or for DNA extraction of cells directly associated with goat milk. A study has not been completed where the quantitative and qualitative DNA extraction results

* Corresponding author: American Institute for Goat Research at Langston University, Langston, OK 73034, US. *E-mail address:* yonathan.tilahun@langston.edu (Y. Tilahun)

from goat milk comparing traditional Bronopol™ and a manufacturer's preservation solution have been used. Milk Preservation Solution (MPS, Norgen Biotek) and Bronopol™ (TAB) preserved DNA in goat milk yield similar qualitative and quantitative results. MPS did not produce higher quantity and quality DNA although this solution was designed specifically for the milk DNA extraction kit. Bronopol™ (TAB) produced yields of similar quantity and quality although it was not designed to be compatible with the Norgen Biotek DNA extraction protocol.

2. Materials and methods

Replicate milk samples were obtained from lactating goats from a herd of Alpine goats on the research farm at Langston University in Langston, OK. Collection and pooling of goat milk samples were completed for two 80-mL samples. Somatic (host) cells in the milk were quantified in fresh milk using a SomaCount FC. Four replicate samples were treated with two preservation methods. DNA was extracted from the goat milk using a Norgen Biotek Milk DNA Preservation and Isolation Kit (Norgen Biotek (3430 Schmon Parkway Thorold, ON Canada, L2V4Y6) in comparison to DNA extraction being completed using the same kit material with Bronopol™ preserved goat milk. Spectrophotometric readings utilizing a Nanodrop™ Lite (Thermo Fosher Scientific Inc., PuDong, Shanghai 201206 P.R. China) double stranded DNA (dsDNA) assay were completed for the goat milk DNA extracted samples using both preservation methods. The quantity and A260/A280 ratio reads were obtained.

3. Results

The MPS and TAB samples were measured for quantity of double stranded DNA (dsDNA) on a Nanodrop™ Lite spectrophotometric instrument. A graphical comparison was complete using bar graphs for Figures 1 and 2 for Trials 1 and 2. Four replicates were completed for the two trials.

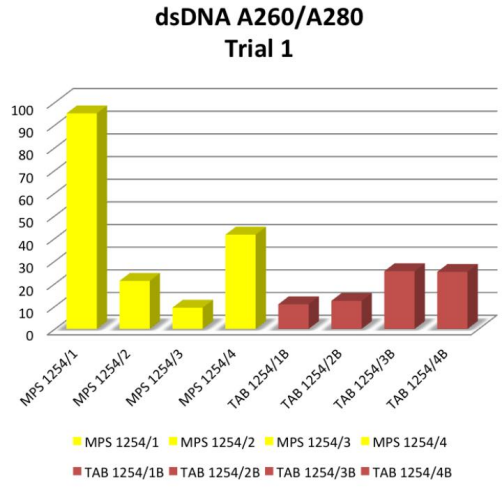

Figure 1. Trial 1: *y-axis* - Total Quantity of dsDNA in ng/µL.

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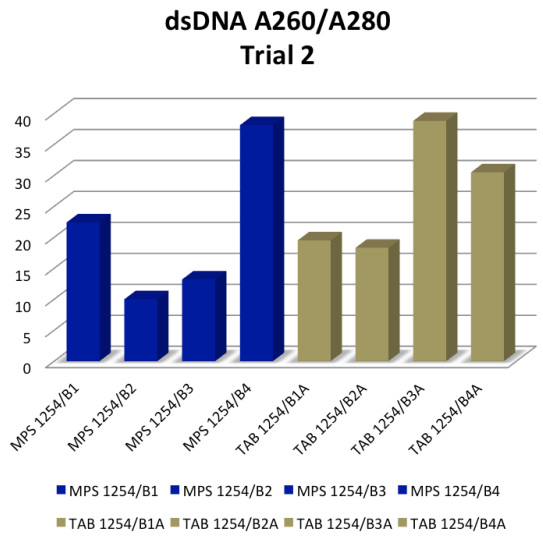

Figure 2. Trial 2: *y-axis* - Total Quantity of dsDNA in ng/µL.

The quality of four DNA replicate samples of MPS and TAB were compared graphically in Figures 3 and 4. The quality was measured on a ratio of absorbance (A260/A280) using a Nanodrop™ Lite spectrophotometric instrument for dsDNA.

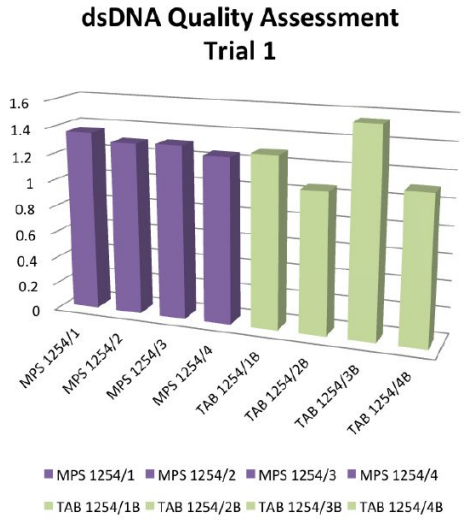

Figure 3. Comparison of Norgen Biotek Preservation solution versus Bronopol™ preserved goat milk, for DNA extraction Quality. The *y-axis* is the A260/A280 ratio of absorbance.

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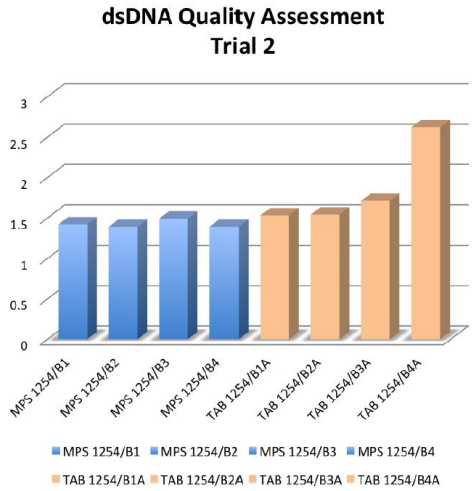

Figure 4. Comparison of Norgen Biotek Preservation solution versus Bronopol™ preserved goat milk, for DNA extraction Quality. The *y-axis* is the A260/A280 ratio of absorbance.

4. Discussion

This study identified that there was no general difference in the preservation in terms of quantity or quality. It showed that the lower costly method of using the Bronopol™ tablet is adequate for preserving somatic cells in milk. How do the two methods compare in longer periods of time? That question requires further study. However, Bronopol™ is a more advantageous, user-friendly method of obtaining somatic cells from goat milk so that the DNA extraction method can be utilized without a loss of quantity or quality all at a lower cost.

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Conflict of interest statement

The authors have declared that no conflict of interest exists.

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* Corresponding author: American Institute for Goat Research at Langston University, Langston, OK 73034, US. *E-mail address:* yonathan.tilahun@langston.edu (Y. Tilahun)