when left untreated can be fatal. Regardless of severity, ketosis has been shown to negatively affect milk production in dairy cows (Rajala-Schultz et al, *J Dairy Sci*, 1999). Unfortunately, in goats, this disease is typically only identified when does show clinical signs, and prognosis is poor. At subclinical levels, which frequently go undetected, reduced milk production likely leads to early culling. Clinical symptoms of ketosis include loss of appetite, ataxia, and general lack of mobility, including increased lying behavior (Andrews et al, *Small Ruminant Res*, 1996). In dairy cows, changes in lying behavior have been shown to be useful as early indicators of compromised health status (Weary et al, *J Anim Sci*, 2009). Therefore, the aim of this study was to examine whether lying behavior could be used as an early predictor of ketosis after kidding in dairy goats.

Materials and Methods

Ten commercial farms in southern Ontario, Canada (40 ± 19 does per farm) were enrolled. Each doe was affixed with a data logger on her rear leg, which allowed for the collection of lying behavior data at 1 minute intervals. Data collection began approximately 3 weeks before kidding and ended approximately 1 week after kidding. During this time period, blood samples were also collected at least once before kidding and at least once following kidding to determine β-hydroxybutyrate (BHBA) levels using a Precision Xtra meter. A total of 62 does (8 ± 6 does per farm) were identified as having either subclinincal (BHBA 1.7 to 3.0 mmol/l) or clinical ketosis (BHBA > 3.0 mmol/l) after kidding. The lying behavior collected for each goat was then paired with the data from a healthy goat (BHBA < 0.8) on the same farm; does were paired according to the same blood sampling date, the same number of fetuses born, and similar kidding dates.

Data logger data is currently being processed to determine daily lying time, daily lying bouts and average daily lying bout duration. Behavior data will be compiled for the 2 week period before diagnosis of ketosis. Mixed models will be used to compare the lying behavior of clinically and subclinically ketotic goats to that of healthy goats.

Results

Based on the established clinical sign of decreased mobility, the prediction is that ketotic does will spend more time lying down, will have fewer lying bouts, and will have overall longer bout duration when compared to healthy does; the difference will be less pronounced in subclinical does. These lying behavior changes will be evident in the weeks prior to diagnosis of ketosis via blood BHBA levels.

Significance

This work will demonstrate that monitoring lying behavior in late lactation goats prior to kidding is a useful predictor of goats at-risk of developing ketosis, thereby identifying these goats for early treatment.

Alpaca growth curves

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Introduction

Evaluating animal growth characteristics is an effective monitoring tool to assess adequacy of the nutritional program. Growth will be directly influenced post-weaning by the amount and quality of the diet consumed. Early growth is indirectly affected by nutrition through the effect of nutrient supply on maternal milk production. Growth curves have been generated for various species, including llamas, but none exist yet for the alpaca. The objective of this project was to develop standardized growth curves for the alpaca from birth through maturity.

Materials and Methods

Body weights (BW) for 720 alpacas in the United States were retrospectively collected from participating farms covering a period of 16 years. Data were collected from 10 alpaca farms in New York, Maryland, Pennsylvania, Ohio, Colorado, and West Virginia, and information included gender, breed (huacaya or suri), date of birth, and date on which BW measurements were taken. Individual BW data were collected from birth until 36 months of age, if available. Data obtained from 2 large farms in Ohio and New York account for more than 70% of the data. Pregnancy status was unknown; therefore

BW data were truncated at 30 months in order to minimize BW being confounded by late pregnancy weight gain. Raw data were reviewed for outliers and values greater than 2.5 standard deviations within a given monthly population were censored. Analysis of variance (ANOVA) statistical models for repeated measures were used to determine effect of age, gender, breed, season of birth, and all interactions on BW. Models accounted for herd as a covariant. Regression modeling of BW on age was used to generate standardized growth and average daily gain curves for the 5^{th}, 25^{th}, 50^{th}, 75^{th}, and 95^{th} percentiles of the population data.

Results

The censored data ANOVA included 2946 observations on 647 individuals from the 10 farms. Age ($P < 0.0001$), gender ($P = 0.013$), season of birth ($P < 0.018$), and their interactions (age x gender, $P < 0.0001$; age x season, $P < 0.0001$; age x gender x season, $P = 0.0002$) significantly influenced BW. Breed did not influence BW ($P = 0.2$), but there was a breed by age interaction ($P = 0.0001$). As expected, alpaca cria exhibit a rapid rate of growth and BW accretion in the first 6 months of life, and reach a median BW of 66 to 77 lb (30 to 35 kg) by weaning age. A slower growth rate was observed, as expected, post-weaning. The growth curve then begins to plateau around 25 months of age when the animals reach maturity, with a median BW of 143 to 165 lb (65 to 75 kg). The median growth curve is characterized by the equation: BW (kg) = 8.89 + 4.66*age (mo) - 0.32*Age^2 + 0.015*age^3 - 0.00024*age^4 ($r^2 = 0.97$, $P < 0.0001$). Maximum daily gain was observed in the second month of life, and declined over the following months.

Significance

Though there are some limitations to this data set, these standardized curves provide a starting point in evaluating alpaca BW growth characteristics relative to quality of the nutritional program. Further studies should include frame size and body condition score measures in order to refine and improve upon these growth curves. These growth curves are based on typical US management feeding systems (forage and supplement), and may not necessarily apply to pasture-based feeding systems.

Evaluation of bovine viral diarrhea virus (BVDV) transmission from a persistently infected goat to pregnant goats and calves

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Introduction

Infections with bovine viral diarrhea virus (BVDV) occur in various artiodactyls. Persistent infections occur in non-bovine species, but rarely in goats. Recently, a persistently infected (PI) goat was born following experimental infection of pregnant goats. The present study evaluated the potential of BVDV transmission from the PI goat to pregnant goats and calves.

Materials and Methods

The PI goat was housed in an isolation room (~97 ft^2 or $9m^2$). BVDV shedding was monitored by monthly viral titration on nasal swabs. Sequentially, 2 groups of BVDV-naïve pregnant goats (3 per group) and 2 groups of BVDV-naïve calves (2 per group) were cohabitated with the PI goat for 3 days. Pregnant goats were freely commingled with the PI goat, sharing feed and water sources. A wire-panel separated calves from the PI goat, allowing nose-to-nose contact. Hay, feed, and water sources were exchanged twice daily between calves and PI goat. On days 0, 6, 8, 10, and 14 and days 0 and 28 following exposure, blood was collected for virus isolation and virus neutralization, respectively. Hay boxes and feed troughs were swabbed to evaluate environmental presence of BVDV.

Results

Shedding of BVDV by the PI goat was documented on nasal swabs (viral titer: ~10^4 $CCID_{50}$) and positive