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Candidato: Olmar Antônio Denardin Costa

a) Titulação Técnica Obrigatória

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OLMAR ANTÔNIO DENARDIN COSTA

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Lactation performance, feed efficiency, and blood metabolites of dairy cows treated with recombinant bovine somatotropin: A systematic review and meta-analysis

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ABSTRACT

A systematic review and meta-analysis were conducted to assess the impact of recombinant bovine somatotropin (rbST) on lactation performance, feed efficiency, and blood metabolites in dairy cows. In the systematic review, articles were selected based on the following criteria: (1) Data focusing on the influence of bovine somatotropin doses on milk production; (2) Submission of original data; (3) Articles published in journals; and (4) Articles in English or Portuguese. The analysis of variance was used with a completely randomized design and mixed models methodology. Polynomial regression was applied to significant fixed effects (rbST dose). The use of rbST resulted in increased milk yield and 4% fat-corrected milk yield, while fat, protein, and lactose contents remained unaffected. Dry matter and metabolizable energy intakes, as well as milk/feed efficiency, exhibited a linear increase, but body condition score (BCS) was negatively impacted. The administration of rbST led to higher blood concentrations of triglycerides and insulin. Cows treated with rbST showed a 23% increase in non-esterified fatty acid (NEFA) concentrations compared to non-treated cows. Additionally, growth factors IGF-1 and IGF-2 displayed a linear increase with rbST treatment. In summary, rbST administration increased milk yield and fat-corrected milk yield without affecting milk components. However, despite increasing intake, it resulted in BCS losses and alterations in blood parameters such as NEFA, IGF-1, and IGF-2.

1. Introduction

Bovine somatotropin (bST) is a naturally occurring hormone that plays a crucial role in mammary gland growth and milk production. In recent years, the use of recombinant bST (rbST), a synthetic form of bST, has become a recurrent practice. The primary objective of rbST administration is to boost milk yield without affecting fat production, thereby positively influencing the lactation curve by modifying physiological processes and increasing the availability of nutrients post-absorption for milk synthesis (Sundrum, 2015; Baumgard et al., 2017).

Bovine somatotropin exerts homeorhetic control by coordinating nutrient partitioning among tissues, ultimately optimizing the animal's productive response. This process directs nutrients towards milk synthesis without compromising animal health (Piantoni and Vande Haar, 2023). Consequently, bST elicits various responses in the animal organism, including protein and glucose synthesis, fat oxidation, and, particularly in lactating animals, the stimulation of milk production (Chaiyabutr et al., 2021).

The postpartum period in cows experiences a shift in nutrient partitioning due to the influence of rbST, compensating for reduced dry matter intake and directing more nutrients and blood flow towards mammary gland milk production through increased gluconeogenesis (Goulart et al., 2013). Furthermore, the application of rbST during lactation not only increases milk production but also enhances health status by facilitating physiological and metabolic adaptations. In early lactating cows, rbST induces hormonal changes and stimulates the

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Trade and consumption of buffalo meat in Brazil

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ARTICLE INFO

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Bubalus bubalis
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ABSTRACT

Due to the lack of information concerning the buffalo production chain, the aim of this survey was to identify consumer behaviour, acceptance and trends in relation to buffalo meat. The survey research method was used, for which an online questionnaire was prepared using Google Forms, and distributed via digital platforms to Brazilian consumers. Using the exploratory technique of multivariate statistics, ordination was carried out by principal component analysis (PCA), where the words were grouped into dimensions. Of the respondents, 44.82% had already consumed buffalo meat; however, many did not know whether they had already tried it, since 50.24% of the respondents said they could not identify any difference between buffalo meat and beef. An identification and indication of the origin were considered important by 44.82% of respondents. The respondents cited 1130 different terms, the word 'quality' appearing in most responses. Principal component analysis explained 93.32% of the variations in the consumer perception of buffalo meat. A part of Brazilian consumers is unaware of the buffalo production chain, and have never had the opportunity to consume the meat. The creation and divulgation of a certificate of identification, together with the benefits to health from consuming buffalo meat is fundamental for consumer confidence, which, together with the ready availability of the product, would allow expansion, consolidation and improvement of the production chain. The results of the study show the potential for increasing the consumption of buffalo meat among Brazilian consumers, providing the product included a guarantee of origin, quality and healthiness.

1. Introduction

The evolution of society has led to changes in consumer behaviour, where foods are now chosen according to their organoleptic characteristics, nutritional quality and safety (Instituto de Tecnologia de Alimentos – ITAL/ABIA, 2020), with the attributes of production methods gaining importance (Spigarelli, Zuliani, Battini, Mattiello, & Bovolenta, 2020). Considering the new demand for safe and healthy foods, together with the quality of life of the consumer, buffalo meat is seen as an interesting alternative source of protein. Buffalo meat is thought of as a commodity. Considering that in most of Brazil and South America marketing is carried out without identifying the meat or its nutritional quality, this lack of information concerning the production chain discourages interest and tends to keep it stagnant, with a lack of the modernisation or investment required to obtain a suitable product that adequately serves the consumer.

Buffaloes are able to convert fibrous and low-quality feed into protein (Guerrero-Legarreta et al., 2020) and have the ability to adapt to the most diverse management conditions (De La Cruz-Cruz, Guerrero-Legarreta, Ramirez-Necoechea, & Roldan-Santiago, 2014), which allows them to be reared in regions with low quality soils and forage in which other species would not be able to produce satisfactorily. This ability to adapt to adverse conditions means that buffalos are generally raised under extensive production systems, which, from the point of view of consumers, leads to better animal welfare (Spigarelli et al., 2020). Like cattle, buffaloes in Brazil are transported by road to be slaughtered using the same vehicles, they are subjected to the same pre-slaughter rest period, and are inspected by systems currently in place in Brazil.

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Partial replacement of nitrogen fertilization with legumes in tropical pasture overseeded with temperate species for the production of steers

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Aruana grass; oat; peanut; ryegrass; urea

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Abstract

Using legumes in forage mixes can help decrease the use of nitrogen fertilizers and possibly increase the nutritive value of pasture. The aim of the current study was to determine animal production and behavioural and ingestion parameters by evaluating the production and nutritive value of Aruana grass (*Panicum maximum* 'Aruana') intercropped with forage peanut (*Arachis pintoi* 'Amarillo') or fertilized with nitrogen. The treatments were N200 (200 kg N/ha per season – summer and winter), 100N + PE (100 kg N/ha per season plus pasture mixture with forage peanut) and N100 (100 kg N/ha per season). The presence of forage peanut in the pasture did not replace nitrogen fertilization as the pasture fertilized with 200 kg of nitrogen had a greater leaf/stem ratio (0.66 *v.* 0.54), stocking rate (2600 *v.* 2290 kg live weight/ha), average daily gain (0.880 *v.* 0.700 kg/day) and live weight gain (LWG) (652 *v.* 468 kg/ha) during summer. During winter, no effect of increased nitrogen fertilization on pasture and animal production was observed. In the total study period (summer + winter), a greater LWG (897 *v.* 741 kg/ha) occurred when a higher quantity of nitrogen (N200) was placed in the pasture compared to the insertion of forage peanuts in the system.

Introduction

In the area between the temperate and tropical climatic regions, persistent combinations of pasture grasses and legumes are rare and monocultures are common (Muir *et al.*, 2011). In sub-tropical and warm-temperate latitudes, a wide range of persistent warm-season perennial grasses commonly occurs as near-monoculture grass pastures or as naturally occurring, mixed-species, grass-dominated rangeland. Forage legumes are often introduced into ruminant systems in order to reduce production costs regarding biological nitrogen fixation (N) and to add nutritional value to the diet (Ferreira *et al.*, 2012; Foster *et al.*, 2014; Mangaravite *et al.*, 2014). Although organic N in soil is partially mineralized by microbial activity, its quantity is not enough to significantly increase pasture quality and availability to enhance animal production. Therefore, it is often necessary to use a combination of different technologies, such as consortia of grasses and legumes, nitrogen fertilization and food supplementation.

Among the benefits of using legumes is the increase in pasture yield because of the increase in soil N availability (Ali *et al.*, 2002), which may supply nitrogen to the system via biological fixation resulting from symbiosis between the legumes and the *Rhizobium* spp. bacteria (MacLean *et al.*, 2007; Maróti and Kondorosi, 2014). The symbiosis between legumes and *Rhizobium* spp. is of high biological and ecological importance because of its contribution to the global N cycle, serving as a model for studying interactions between plants and microorganisms (Okazaki *et al.*, 2016). Moreover, the use of legumes in pasture mixture promotes an increase in animal production by increasing the quantity and nutritional value of the forage offered (Beck *et al.*, 2016). This high-nutritional value results from the high levels of crude protein (CP) and high digestibility of legumes (Lüscher *et al.*, 2014).

Alencar *et al.* (2018) considered the pintoi peanut (*Arachis pintoi* Krapovickas and Gregory) as a potential viable candidate to be used in mixed stands in tropical regions because of its superior nutritional value, persistence, soil cover, tolerance to shading and fast establishment. In the current study, it was hypothesized that adding N-fixing legumes in mixed temperate-tropical pastures overcomes N-fertilizer reductions, providing similar or greater levels of animal performance. In order to test the hypothesis, productive grazing parameters, performance and ingestion behaviour of animals kept in pasture were assessed.

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RESEARCH ARTICLE

Beef steer performance on African Bermuda grass pasture overseeded with black oat and annual ryegrass: effects of added irrigation and temperate legumes

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Abstract

Increasing productivity and resource efficiency through sustainable intensification of grazing systems impose new challenges on crops and livestock. The sustainability of world agriculture is threatened by the degradation of ecosystem services anthropogenic interventions such as reduced biological diversity, water and air pollution, and loss of soil quality. The search for technologies that increase animal productivity with economic and environmental sustainability is necessary. The aim was to determine whether productive systems based on African Bermuda grass, overseeded in rows with annual ryegrass and black oat, would present better beef cattle performance by irrigation and/or inclusion of forage legumes in the grazing systems. We used 72 steers, 24 in each of the 3 years of evaluation, distributed in 12 paddocks under rotational stocking. Each paddock had four sub-paddocks. The experiment was completely randomized in a 2 × 2 factorial arrangement, using irrigation and legumes as factors. Production and chemical composition of pastures and animal performance were evaluated for 3 years in winter, spring, and summer. The irrigation provided promising results in spring, with a higher stocking rate (2194 vs 1254 kg/ha) and live weight gain per area (5.24 vs 2.81 kg/ha/day) in the second year due to water restriction. The forage legumes with irrigation provided a higher average daily gain in the summer than the non-irrigated pasture with legumes. Here we show for the first time that in long-term results (3 years), the pastures with legumes showed a high live weight gain per area (1556 vs 1452 kg/ha/year), and in the third year, the highest difference for the stocking rate in the summer (4134 vs 3311 kg/ha). Legumes or irrigation do not change the pasture's nutritional compounds. The use of forage legumes benefits the grazing system with long-term results. Irrigation, conversely, allows for positive responses during periods of water deficit.

Keywords Beef cattle · Farming · Mixed pasture · Livestock

Abbreviations

ADG	Average daily gain
ADF	Acid detergent fiber
CP	Crude protein
DM	Dry matter
IVDMD	In vitro dry matter digestibility
LI	Light interception
LW	Live weight
LWG	Live weight gain

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A2

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Variation in bovine milk stability according to lactational stage and genetic group

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Research Article

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Abstract

We address the hypothesis that at early and late lactation milk presents low ethanol stability due to high acidity and ionic calcium values. Our aim was to evaluate the functional traits of milk (milk ethanol stability: MES, acidity and ionic calcium: iCa) according to lactation stage in different genetic groups. Raw milk samples were collected from Jersey ($n = 271$), Holstein ($n = 248$) and Jersey × Holstein crossbred cows ($n = 82$), raised on five commercial farms located in the state of Paraná, Brazil. Milk composition, somatic cell count (SCC), milk urea nitrogen (MUN), MES, pH, acidity and iCa were determined. Days in milk (DIM) were categorized into four classes: 1–60, 61–150, 151–305 and over 305 DIM. Data were submitted to analysis of variance. Fixed and random effects were incorporated into the model, in a repeated measures in time arrangement using the mixed models methodology. Significant interactions between DIM class and genetic groups were detected. The comparison between each combination of genetic group and DIM class showed that at the beginning of lactation, Holsteins produced milk with higher MES than Jersey and crossbreds. At 105–305 DIM Holstein milk presented higher MES than Jersey, while beyond 305 DIM Holstein milk showed higher MES than crossbred cows. At the beginning of lactation acidity was higher in Holstein milk and crossbreds compared with Jersey, while acidity was lower in Holstein milk compared with Jersey and crossbreds in the other lactation stages. Ionic calcium was highest after lactation peak for Holstein, but did not vary between lactation stages for Jersey and crossbreds. Functional characteristics of bovine raw milk such as MES, iCa and acidity varied between lactation stages in a distinct manner according to genetic groups. Early and end lactation stages are challenging in terms of low stability, especially for Jersey and crossbreds.

Milk ethanol stability (MES) is a functional characteristic of milk still measured in several countries such as Brazil, Uruguay and Argentina to indicate the adequacy of raw milk for thermal processing (Fischer *et al.*, 2012). MES is the primary test at on-farm level, before loading milk for transportation (Chavez *et al.*, 2004). Briefly, it is performed mixing an equal volume of milk sample from the bulk tank and ethanol solution, stirring and visual inspection for clots appearance. If there is clot formation, the milk is considered to be unstable (Brasil, 2018). Previously, the main reason associated with low MES was the high acquired acidity (pH <6.4 or acidity higher than 0.18% lactic acid), but recently low stability in milk showing acidity within the normal range values (0.14 to 0.18% lactic acid) has become more prevalent (Machado *et al.*, 2017; Martins *et al.*, 2024).

In the ultra-high temperature (UHT) process, milk is subject to temperatures above 135°C for a few seconds giving a product with a shelf-life of several months. In countries where UHT is the main form of fluid milk processing, thermal stability is of paramount importance to avoid fouling in equipment during processing or sedimentation and/or gelation during storage (de Souza *et al.*, 2023). Casein stability may be estimated using the ethanol test (Horne, 2016). Therefore, to endure the UHT process, milk should present MES of at least 76% (Shew, 1981).

Low milk stability is associated with protein compositional changes such as the proportions of kappa-casein, β-lactoglobulin and α-lactalbumin (Barbosa *et al.*, 2012; Fagnani *et al.*, 2018; Pinheiro *et al.*, 2022), high acidity or low pH (Chavez *et al.*, 2004) as well as variations in the concentration of mineral salts (Tsioulpas *et al.*, 2007*b*; Horne, 2016; Akkerman *et al.*, 2019; Pinheiro *et al.*, 2022). These arise from inappropriate physiological and metabolic conditions (Marques *et al.*, 2010, 2011; Martins *et al.*, 2015), heat stress (Abreu *et al.*, 2020), feed restriction (Fruscalso *et al.*, 2013; Stumpf *et al.*, 2013; Gabbi *et al.*, 2016) and nutritional imbalances (Marques *et al.*, 2010; Martins *et al.*, 2015; Gabbi *et al.*, 2016).

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REGULAR ARTICLES

Biofortification of cow milk through dietary supplementation with sunflower oil: fatty acid profile, atherogenicity, and thrombogenic index

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Abstract

The present study aimed to assess the effects of replacing the starchy ingredients of concentrate by increasing the levels of sunflower oil on the production, composition, fatty acid profile, and evaluate the atherogenicity and thrombogenic index of Jersey cow's milk. Eight Jersey cows were arranged in a double Latin square and distributed in treatments consisting of supplementation with increasing levels of sunflower oil replacing the corn grain and wheat bran of concentrate, including the following: T0 (control diet), without sunflower oil and with 38 g ether extract (EE)/kg dry matter (DM); T1 = 65 g EE/kg DM; T2 = 86 g EE/kg DM; and T3 = 110 g EE/kg DM. The daily milk production was measured, and the corrected milk production was calculated. Milk samples were analyzed by infrared spectroscopy to determine fat, protein, lactose, and total solids, whereas the lipid profile was assessed by gas chromatography. Milk production, energy-corrected milk production, fat content, daily fat production, lactose, and total solids were not affected by the treatments. Protein, lactose, and total solids concentrations decreased. Short-, medium-, and odd-chain fatty acids decreased with an increase in sunflower oil levels. Conversely, linear increases in long-chain, monounsaturated, and polyunsaturated fatty acid concentrations were observed. There were significant increases in stearic and elaidic acids and conjugated linoleic acid isomers, especially in vaccenic and rumenic acids. There was a positive effect on the milk atherogenicity, thrombogenicity, and nutraceutical indices. Dietary supplementation with sunflower oil changes the milk FA profile, decreases the atherogenicity and the thrombogenicity indices, and improve the nutraceutical index up to the addition of 86 g EE/kg DM de sunflower oil in the diets of Jersey cows.

Keywords CLA · Vaccenic · Nutraceutical · Sunflower · Milk · Fatty acids

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Abbreviations

FA	Fatty acid
MUFAs	Monounsaturated fatty acids
PUFAs	Polyunsaturated fatty acids
SFAs	Saturated fatty acids
CLA	Conjugated linoleic acid
NFCs	Non-fibrous carbohydrates,
ECL	Equivalent chain length
EE	Ether extract
FAMEs	Fatty acid methyl esters
NI	Nutraceutical index
DM	Dry matter
NEl	Net energy for lactation

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ANIMAL SCIENCE

Intake, digestibility and ruminal parameters of lambs fed with increasing levels of wheat bulgur

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Abstract: The aim was to evaluate the effect of the inclusion of wheat bulgur in the diet on intake, digestibility, N balance and ruminal parameters in cannulated lambs. Four castrated Santa Ines×Dorper lambs, cannulated in the rumen, (45 ± 9 kg) were housed in metabolism crates. They were randomly distributed in a 4×4 Latin Square,10-day adaption, a 6-day sampling period. The base diet was composed by ryegrass hay and concentrate, in a 40:60 roughage:concentrate ratio and four inclusions of wheat bulgur on the total diet: 0, 190, 380 and 570 g/kg dry matter. The inclusion of wheat bulgur did not affect the intake of non-structural carbohydrates. The intake of dry matter, fiber, crude protein, organic matter and crude fat decreased linearly ($P<0.05$). The digestibility of neutral detergent fiber decreased linearly ($P=0.001$). The N retained and the excreted in urine were not affected by wheat bulgur inclusion. Fecal excretion, total excretion and absorbed N, decreased linearly ($P<0.05$). There was no change on pH, ammonia, soluble carbohydrates and protozoa population in rumen. Increasing of wheat bulgur in the diet of lambs decrease the nutrient intake and fiber digestibility without affecting the digestibility of other compounds, ruminal parameters, and the protozoa count.

Key words: alternative feeding, ruminant, nutritional quality, ruminal biology.

INTRODUCTION

In animal production systems, feeding represents the largest portion of the cost, therefore, searching for alternative sources of food with good nutritional quality, affordability and availability is important for the success of this productive activity. The use of by-products from agricultural industries can become an alternative for formulating diets potentially reducing feeding costs (Cruz et al. 2011).

The wheat bulgur is a by-product obtained through wheat classification, consisting of well formed grain in a smaller size, composed by wheat grains that leak through oblong mesh sieves of 1.75 mm x 20.00 mm. In certain conditions, it may contain varying amounts of broken grains, hollow grains, wheat particles (husk, stems and leaf fragments) and non-wheat originated particles (dirt, stones, seeds and other plant debris) that also leak through sieves, such factors make the product unfit for human consumption. Certain wheat batches that do not reach the specific weight required for milling or meet the classification for manufacturing flour are also called wheat bulgur (Barbosa et al. 1990).

The use of wheat bulgur in the feeding of non-ruminants has already been evaluated in several studies, for feeding poultry (Nunes et al. 2001), swines (Barbosa et al. 1990, Hauschild et al. 2004) and fish (Signor et al. 2007); however, in ruminant feeding there is a lack of studies.

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Legume inclusion or nitrogen fertilization on Aruana grass overseeded with temperate grasses: Performance, carcass characteristics, and fatty acid profile of the meat of beef steers

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ABSTRACT - The objective of our study was to evaluate the effect of the use of legume (*Arachis pintoi*) or nitrogen fertilization on animal performance, characteristics of carcass and meat, and fatty acids profile of crossbred steers on *Megathyrsus maximus* cv. Aruana pasture, overseeded with temperate grasses. The experimental design was completely randomized, with three treatments and three replicates. The experiment was carried out from June to October (127 d). The treatments were: Low-N: 100 kg of N/ha; Medium-N: 200 kg of N/ha; and Legume: *Arachis pintoi* + 100 kg of N/ha. The pasture with higher nitrogen fertilization (N200) showed a more significant forage mass yield. The mixed grass with legumes presented a higher concentration of saturated fatty acids and saturated:unsaturated ratio in the meat. However, the grass pastures resulted in a higher content of unsaturated fatty acids in the meat. The other pasture variables, and characteristics of carcass and meat were not influenced by the treatments. The increase in nitrogen fertilization, from 100 to 200 kg/ha, and *Arachis pintoi* mixed with Aruana grass pasture overseeded with black oat and ryegrass does not affect the daily weight gain and the carcass and meat characteristics of the steers. The grass-legume mixture decreases the total concentration of unsaturated fatty acids in meat without influencing the concentration of polyunsaturated fatty acids.

Keywords: animal production, annual grassland, *Arachis pintoi,* fatty acid, mixed pasture

1. Introduction

Nitrogen fertilization on forage production brings good results (Beck et al., 2017), influencing animal productivity like the carrying capacity (Pontes et al., 2018). However, there is some pressure to reduce the use of nitrogen fertilizers due to economic and environmental issues (Beck et al., 2017). The replacement of nitrogen fertilizers by nitrogen fixation of legumes can be a potential alternative to substitute part of the nitrogen fertilization.

In tropical regions, the grass-legume mixture is rare, and single crops are more common (Muir et al., 2011). For the subtropical and warm-temperate latitudes, a wide range of persistent warm-season perennial grasses is available. They commonly occur as near-monoculture grass pastures. In this way,

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Yolk and eggshell colour: are these the parameters that influence egg purchasing? A systematic review

Ana Carolina Fluck, Kátia Maria Cardinal, Olmar Antônio Denardin Costa, Leonardo Piffer de Borba & Paula Gabriela da Silva Pires

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Yolk and eggshell colour: are these the parameters that influence egg purchasing? A systematic review

Ana Carolina Fluck[a], Kátia Maria Cardinal[b], Olmar Antônio Denardin Costa[a], Leonardo Piffer de Borba[a] and Paula Gabriela da Silva Pires[c]

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SUMMARY

Factors such as price, egg availability, lifestyle and origin influence egg purchases. The eggshell and yolk colour can also influence consumer decisions at the time of purchase. Therefore, the objective of the study is to identify whether the physical characteristics of eggs, such as the colour of the yolk and shell, influence the purchase decision through a systematic review using the PRISMA guidelines. After the selection, 17 studies (from 1963 to 2021) were compiled. The United States presented the largest number of studies on the topic among the countries. The number of article observations ranged from 197 to 7845 respondents, and it was possible to verify that most of the respondents were women. Most respondents showed preference for brown eggs and the medium yellow colour was the most cited answer as preferred by consumers. Although eggs are one of the most consumed foods of animal origin in the world, there is still a lack of knowledge on the part of consumers about the factors that influence the characteristics of eggs, demonstrating that inaccurate information can affect preferences and consumption habits.

KEYWORDS

Consumer attitude; consumption habits; demographic characteristic; egg characteristics; food choice

Introduction

Contemporary food consumers have become more critical as they become concerned about many heterogeneous attributes of food products. Currently, consumers have publicly available information to learn about food production, animal welfare and developed products that have different attributes (Francisco *et al.* 2015; Okello *et al.* 2018). However, such information is not from reliable sources and conveys inaccurate facts, and consumers expect to obtain relevant, accurate and reliable information needed for their food decision-making or learning process (Lin *et al.* 2019; Volpentesta *et al.* 2017).

Few studies have been carried out with the aim of verifying the perception and attitudes of the consumer in relation to eggs, despite their importance as a food rich in proteins with high biological value. Most surveys focus on the association of eggs with

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REGULAR ARTICLES

Physiological response to heat stress and ingestive behavior of lactating Jersey cows in silvopasture and conventional pasture grazing systems in a Brazilian subtropical climate zone

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Abstract

The aim of this study was to evaluate the physiological response to heat stress and ingestive behavior of Jersey cows in silvopasture and conventional pasture grazing systems. The experiment was carried out during the warm season, spanning spring, summer, and fall seasons in the Brazilian subtropical climate zone. Twelve lactating Jersey cows were observed in rotational grazing on *Cynodon nlemfuensis* Vanderyst and *Panicum maximum* Jacq. Treatments were composed of different grazing systems (silvopasture and conventional pasture). The silvopasture grazing system had eucalyptus trees (*Eucalyptus grandis* Hill ex Maiden) with an average height of ≈ 10 m and row spacing of 20 m. In the conventional pasture grazing system, there were no rows of eucalyptus and no other type of tree or structure to provide shade to the animals. During the summer and fall periods of evaluation, the silvopasture animals presented a lower respiratory rate, whereas during the spring and fall evaluation periods, these animals presented a lower rectal temperature. Cattle in the silvopasture showed longer grazing times at night (+21.65 min) and overall (+36.00 min) and remained lying down (ruminating and resting) for longer (+ 73.07 min) than conventional pasture grazing system animals. In addition, the animals in the silvopasture had a lower water intake (3.12 L/100 kg BW). The silvopasture grazing system improved the welfare of the grazing Jersey cows, as evidenced by the improvement in physiological response to heat stress, increased grazing time and decreased standing time (resting + ruminanting) when compared to cows in the conventional pasture grazing system.

Keywords Animal welfare · Grazing dairy cows · Environment · Integrated production systems · Rotational grazing · Shading

Introduction

In tropical and subtropical climate zones, cattle suffer from solar radiation incidence during the hottest time of the day, which compromises animal welfare as they must adapt to the environment in pasture grazing livestock models (Broom 1986). In conventional pasture-based grazing systems where animals are exposed to direct solar radiation and subjected to thermal stress, losses in milk productivity can reach 15% and can decrease by up to 40% under severe stress conditions (West 2003).

Physiological and behavioral response to heat stress of the animal are triggered in an attempt to maintain body homeostasis in these warm climate regions. Previous studies have observed dry matter intake reduction (Rhoads et al. 2009), standing time and vaginal temperature increase (Kendall et al. 2016), rectal temperature increased (Nonaka et al. 2008), hair coat surface temperature elevation (Vieira et al. 2019), respiratory rate increase (Polsky and Von Keyserlingk 2017) and peripheral vasodilation (Anderson et al. 2012), among others, in cattle exposed to warm weather conditions.

The silvopasture grazing system improved the thermal comfort of animals in the hottest hours of the day through the provision of a better microclimate (lower air temperature and lower temperature-humidity index (THI)) when compared to the conventional pasture grazing system (Améndola et al.

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Evaluation of mathematical models to describe gas production kinetics of some tropical and temperate forages

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ABSTRACT - Our objective was to identify the best fit mathematical models for *in vitro* gas production kinetics using rumen fluid and forage plants commonly used in ruminant feed to obtain better estimates of parameters that describe the rumen fermentation. Four mathematical models were tested, two unicompartmental (M1 = first order, M2 = Gompertz) and two bicompartmental (M3 = M1 + M2; M4 = M2 + M2). Two temperate grasses were evaluated, as well as four tropical grasses and three temperate forage legumes. The fit of the models was verified by the corrected Akaike information criterion ($AICc_r$) and the difference among $AICc_r$ values (Δ_r), likelihood probability (W_r), and relative likelihood (ER_r). Temperate forages reached maximum gas production between 48 and 72 h. In the tropical forages, it occurred only after 72 h. In profiles in which M3 was the best choice, the values of parameters V_{f1} were higher than those of V_{f2}, and k_1 values were higher than k_2 values. The only exception was for Tifton 85 profile, whose V_{f2} value was higher than V_{f1}. The model M3 has a better fit for tropical forages with higher fiber content and lower levels of nonfibrous carbohydrates and crude protein. The model M1 has a better fit for forage with higher nonfibrous carbohydrate contents and low lignin content.

Keywords: *in vitro*, kinetic parameters, ruminal kinetics

Introduction

Degradation rate changes may happen depending on the plant and the parts that are available for degradation (Vieira et al., 2012; Abreu et al., 2014), due to the proportion and digestibility of fibrous (FC) and nonfibrous carbohydrates (NFC). These changes occur with great frequency, both with the advance of the forage cycle, as between species. The digestive process of different substrates does not occur at the same rate and, consequently, the fermentation profiles and gas production from degradation is variable. Thus, it is important to identify the degradation profile of each forage species to obtain better use of the nutrients with the appropriate adjustment of the diets, according to the degradation rates of each food.

Mathematical models that describe ruminal kinetics profile are generally sigmoid (Mertens, 1977; Van Milgen et al., 1991; Dhanoa et al., 1995), characterized by an initial delay (lag time) followed by an exponential growth that decelerates until reaching an asymptotic phase (Vieira et al., 2008). Carbohydrates from plant cell walls have a diverse nature (Van Soest, 1994); thus, Schofield et al. (1994),

A4

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Behavioural and physiological measures: correlation and relevance in evaluating the welfare of beef cattle

Medidas comportamentais e fisiológicas: correlação e relevância para avaliação do bem-estar de bovinos de corte

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Highlights

Cortisol is a reliable indicator of temperament in beef cattle.
Cortisol in beef cattle can be estimated using the glycaemic index.
The portable glucometer is accurate in determining blood glucose levels in cattle.

Abstract

This study investigated the correlation between the scale score and flight distance with physiological stress indicators and its relevance to welfare assessments in beef cattle. Plasma glucose testing in the laboratory was compared to capillary blood testing using a portable glucometer to test/validate the methodology in cattle. Thirty-six cattle were studied, divided into two treatments, where each animal was considered one experimental unit. Each group comprised 18 randomly chosen cattle, which were evaluated over 490 days. A descriptive analysis (mean, standard deviation and coefficient of variation), an analysis of repeated measurements over time, and the Pearson correlation were carried out, followed by a randomisation test. The effect of the treatments was measured using the following indicators: flight distance, composite scale score, plasma glucose, capillary glucose and blood cortisol, evaluated in repetitions over time. The results showed a moderate association (0.57414) between the composite scale score and flight distance, while the composite scale score, capillary glucose (0.63870), plasma glucose (0.63386) and cortisol (0.62329) were highly correlated. The composite scale score and the

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Effects of replacing ryegrass silage with alfalfa hay on N utilisation efficiency, intake, and digestion in sheep

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KEY WORDS: alfalfa, feed intake, microbial nitrogen, retained nitrogen, rumen ammonia

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ABSTRACT. Inclusion of legumes in ruminant diets increases the nutritional value and contributes to N fixation in the soil. The aim of this study was to determine the optimal level of alfalfa hay (*Medicago sativa* L.) as a partial replacement for ryegrass silage (*Lolium multiflorum* L.). Alterations in nutrient intake, N utilisation efficiency, rumen parameters, and microbial protein synthesis in sheep were investigated. Four rumen cannulated wethers, without a defined breed, in a Latin square 4×4 design, were fed four experimental diets formulated to replace ryegrass silage with alfalfa hay at a rate of 0, 15, 30, or 45%. Animals that received high levels of alfalfa showed a linear trend in dry matter intake and digestible organic matter content. Dietary N was utilised more efficiently, resulting in reduced N release into the environment when alfalfa was included in the diet. True N digestibility and retained N levels increased linearly with increasing proportion of dietary alfalfa. The efficiency of protein synthesis in the rumen remained unaffected. Furthermore, replacing ryegrass silage with alfalfa hay did not affect rumen pH. It can be concluded that such substitution enhances the intake of digestible organic matter, reduces rumen ammonia N concentrations, and increases N retention in sheep. In addition, the supply of the grass-legume mixture in the trough allows for better utilisation of the forage, thereby avoiding the setbacks and costs associated with mixed grass and legume pastures. Further studies are needed to evaluate other forage legume species because Brazil has a range of legumes that could be exploited for ruminant feed production.

Introduction

Fluctuations in the availability and nutritional value of forage throughout the year are among the factors that have the greatest impact on animal performance. Gerdes et al. (2000) evaluated tropical species throughout the year, and recorded forage production of 3.76, 2.03, 1.19 and 0.95 t dry matter (DM) ha^{-1} in spring, summer, autumn and winter, respectively. Additionally, neutral detergent fibre (NDF) levels varied, averaging 71% in the spring-summer period and 75% in the autumn-winter period, while crude protein (CP) levels ranged from 3.45% in winter to 12.9% in summer months. In southern Brazil, the inclusion of temperate grasses during the winter period is a common strategy on farms, utilised for grazing or ensiling purposes. Grass silages from temperate climates are distinguished by their good digestibility, high nitrogen content, and low neutral detergent insoluble fibre, imparting better nutritional value to the diet compared to maize silage, traditionally used in forage fields

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Fermentation parameters and nutritional value of olive cake silage

Parâmetros fermentativos e valor nutricional da silagem de torta de oliva

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Highlights

Adding corn to olive cake silage improves pH.
Adding corn to olive cake silage reduces the fibrous carbohydrates and lignin levels.
When the cake is stored for 48 hours, there is a loss of non-fibrous carbohydrates.

Abstract

The aim of this research was to improve the fermentation parameters and the nutritional value of olive cake silage (*Olea europaea* "Arbequina") *in natura* through two periods of rest of the material after the extraction of olive oil and/or with the addition of levels of ground corn. The matter was ensiled in two times after extraction (zero and 48 hours), using ground corn grain on dry matter basis, as an additive in the levels: 0, 5 and 10% of ensiled olive cake wet matter. The design was completely randomized, and the silages tested for fermentation characteristics, conservation, concentration of phenolic compounds, chemical composition and nutritive value. The silages did not differ in non-protein nitrogen, silica and

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REVIEW

Growth performance and rumen development of Jersey calves fed high milk levels in a 60-day lactation program

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KEY WORDS: calf, dairy cattle, development, whole milk feeding

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ABSTRACT. The study evaluated the effects of supplying whole milk at three different rates (15, 20 and 25% according to live weight at birth) in the diet of Jersey calves during the first 60 days after calving. Twenty-four animals (12 females and 12 males), with an average birth weight of 26.17 ± 2.94 kg, were randomly assigned to treatments consisting of four males and four females per group. Weekly assessments included body weight measurement, estimations of milk and concentrate intake, and measurements of morphometric parameters, including croup height, croup width, chest circumference, and height at withers. After 60 days, only males were slaughtered to evaluate the development and volume of gastric compartments and histological development. The Gompertz unipartite model with discrete latency was used to measure the growth curve behaviour over the 60-day evaluation period. Preliminary data visualization involved examining the spatial distribution on a Cartesian plane. Both lactation feeding level and sex of the calves influenced dry matter intake, with higher consumption and earlier onset observed in the treatment with lower milk amounts. The amount of milk also affected weight at the end of the lactation period and croup height, although male rumen development was not influenced by the rates of milk supplied.

Introduction

The dairy sector has presented a worrisome scenario in 2023 with the departure of medium- and small-scale producers and the consequent reduction in herd size. This trend has been observed in several countries, including Brazil, Argentina, New Zealand as well as the members of the European Union (EC, 2023; Embrapa, 2023). However, the remaining production systems have become more efficient, maintaining stable milk production despite a smaller herd. This shift reflects a focus on improving animal productivity, optimising or reducing production costs, and achieving higher profitability.

The growth begins at birth and continues through the lactation phase. However, a common perception among producers is that feeding milk to calves represents a loss, as it cannot be sold. This belief often leads to lower milk supply, as it is more expensive than solid feed. Consequently, calves may be transitioned to solid feed earlier to reduce feeding costs (Eckert et al., 2015). Soberon et al. (2012) investigated the relationship between pre-weaning nutrient intake and future milk production using a standard 305-day milk production mathematical

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ANIMAL PRODUCTION

Influence of low and medium intake supplements in the growing phase of steers grazing in the tropical pasture and finished in feedlot

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ABSTRACT: The objective was to evaluate the animal production and ingestive behavior of the steers fed different supplements during the growth phase in Aruana grass, and the influence of this supplementation on production performance in feedlot phase. The treatments consisted of three supplements during the growing phase: mineral salt (0.12 g/kg of body weight – BW), low intake energy-protein supplement (1.26 g/kg of BW), and medium intake (3.76 g/kg of BW). Forage canopy characteristics, animal production, and animal behavior on pasture were evaluated in a completely randomized design with three replicates (paddocks). The titanium dioxide marker was used to determine the intake and apparent digestibility during the pasture phase. The production performance in feedlot was evaluated in a completely randomized design with eight replicates (animals). Twenty-four Aberdeen Angus steers (15 ± 1.5 months old; 364.8 ± 21.7 kg BW) were used. At the end of the growth phase the animals were confined and fed a single diet. Dry matter, crude protein, and neutral detergent fiber (NDF) contents of forage and intake were not influenced by the treatments. The average daily gain was higher for the medium intake supplement in pasture phase. The apparent digestibility of NDF (P = and chewing rate were higher for the medium intake supplement. The average daily gain and fat thickness of carcasses were higher for the medium intake supplement in the feedlot phase. The supplements of medium intake increase animal productivity during the growing phase on pastures and cattle's finishing performance in intensive production systems.
Key words: average daily gain, dry matter intake, fat thickness, ingestive behavior, self-fed supplements.

Influência de suplementos de baixo e médio consumo na fase de crescimento de novilhos mantidos em pastagem tropical e terminados em confinamento

RESUMO: O objetivo deste trabalho foi avaliar a produção animal e o comportamento ingestivo de novilhos alimentados com diferentes suplementos durante a fase de crescimento em capim Aruana, e a influência desta suplementação sobre o desempenho produtivo durante a fase de terminação em confinamento. Os tratamentos consistiram de três suplementos durante a fase de crescimento: sal mineral (0,12 g/kg do peso corporal – PC), suplemento energético-proteico de baixo consumo (1,26 g/kg do PC) e suplemento energético-proteico de médio consumo (3,76 g/kg do PC). As características do dossel forrageiro, a produção animal e o comportamento ingestivo em pastos de capim Aruana foram avaliados utilizando um delineamento inteiramente ao acaso com três repetições (piquetes). O marcador externo dióxido de titânio foi utilizado para determinar o consumo e digestibilidade aparente dos nutrientes na fase de pastagem. O desempenho em confinamento foi avaliado utilizando-se um delineamento inteiramente ao acaso com oito repetições (animais). Vinte e quatro novilhos Aberdeen Angus (15 ± 1,5 meses de idade; 364,8 ± 21,7 kg de peso corporal médio inicial) foram utilizados. Ao final da fase de recria, os animais experimentais foram confinados e alimentados com uma dieta única. Os teores de matéria seca, proteína bruta e fibra de detergente neutro (FDN) da forragem, bem como o consumo destas frações não foram alterados pelos tratamentos. O ganho médio diário foi superior para o suplemento de ingestão média na fase de pastagem. A digestibilidade da FDN e a taxa de ruminação na fase pastagem foram mais elevadas para o suplemento de média ingestão. O ganho médio diário e a espessura de gordura das carcaças foram mais elevados para o suplemento de ingestão média na fase de acabamento em confinamento. Suplementos de ingestão média aumentam a produtividade animal durante a fase de crescimento em pastagens e o desempenho em confinamento de bovinos provenientes de sistemas intensivos de produção.
Palavras-chave: ganho de peso médio diário, consumo de matéria seca, espessura de gordura, comportamento ingestivo, suplementos auto-alimentados.

INTRODUCTION

Fluctuations in the quantity and quality of forage in tropical pastures make maintaining the growth of cattle challenging because there is rarely a balance between the requirements and supply of nutrients (BARBERO et al., 2021). The low post-weaning growth rates produces lighter and leaner carcasses (SILVA et al., 2017). These problems can be overcome by optimizing animal performance and improving pasture utilization efficiency through supplementation (CASAGRANDE et al., 2013).

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Zootechnical performance of Dorper x Santa Inês lambs raised in different production systems

Abstract – The objective of this work was to compare the zootechnical performance of Dorper x Santa Inês crossbred lambs finished in grazing systems on *Megathyrsus maximus* Aruana cultivar pasture, with and without shading, and in a feedlot. Twenty-four non-castrated lambs were used in a completely randomized experimental design, with the three following treatments with eight replicates each: 'Aruana' pasture without shading + supplement; 'Aruana' pasture with shading + supplement; and feedlot, with diet containing ryegrass hay and concentrate at a 20:80 ratio. The treatments did not influence lamb age at slaughter, birth weight, leg compactness, true yield, and main cut yield, except that of breast tip + flank that was lower for the pasture with shading. However, average daily gain, body condition score, live weight at slaughter, carcass compactness index, cold carcass and empty body weights, and cold carcass yield differed between treatments, showing higher values in the feedlot. Termination in the feedlot increases the zootechnical performance of Dorper x Santa Inês sheep and favors a lower age at slaughter, as well as a greater weight of the main commercial cuts, but not their yield.

Index terms: *Ovis aries*, performance, silvopastoral system, supplementation.

Desempenho zootécnico de cordeiros Dorper x Santa Inês criados em diferentes sistemas de produção

Resumo – O objetivo deste trabalho foi comparar o desempenho zootécnico de cordeiros mestiços Dorper x Santa Inês terminados em sistemas de pastejo sobre pastagem de *Megathyrsus maximus* cultivar Aruana, com e sem sombreamento, e em confinamento. Utilizaram-se 24 cordeiros não castrados em delineamento experimental inteiramente casualizado, com os três seguintes tratamentos, com oito repetições cada um: pastagem de 'Aruana' sem sombreamento + suplemento; pastagem de 'Aruana' com sombreamento + suplemento; e confinamento, com dieta contendo feno de azevém e concentrado na proporção de 20:80. Os tratamentos não influenciaram a idade dos cordeiros até ao abate, o peso ao nascer, a compacidade da perna, o rendimento verdadeiro e o rendimento dos cortes principais, exceto o da ponta do peito + flanco que foi menor na pastagem com sombreamento. Entretanto, o ganho médio diário, o escore de condição corporal, o peso vivo ao abate, o índice de compacidade da carcaça, os pesos da carcaça fria e do corpo vazio, e o rendimento de carcaça fria diferiram entre os tratamentos, com valores superiores no confinamento. A terminação em confinamento aumenta o desempenho zootécnico de ovinos Dorper x Santa Inês e favorece a menor idade ao abate, bem como o maior peso dos principais cortes comerciais, mas não o seu rendimento.

Termos para indexação: *Ovis aries*, desempenho, sistema silvipastoril, suplementação.

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Yolk and eggshell: are these the parameters that influence eggs purchasing?

Gema e casca de ovos: são estes os parâmetros que influenciam a compra dos ovos?

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ABSTRACT
We aimed to identify whether the physical characteristics of the eggs such as yolk and eggshell color influence the purchase decision through a consumer survey compound by 1567 individuals' information answered from different regions, genders, income, and education levels in Brazil. The opinion of the participants was evaluated through the free word associations, related to the preferences for the physical characteristics of the eggs. Afterward, the individuals were asked to answer questions related to their preferences regarding visual characteristics, especially the yolk and eggshell color. A significant portion of participants claims to have consumer preferences based on the eggshell color, not just the price, even when we isolate the gender. Even though eggs are one of the most consumed foods of animal origin in the world, there is still a lack of knowledge on the part of consumers about the factors that influence the characteristics of eggs, demonstrating that wrong information can affect preferences and consumption habits.

Keywords: consumer attitude, consumption habits, demographic characteristic, egg characteristics, food choice.

RESUMO
Nosso objetivo foi identificar se as características físicas dos ovos, como cor da gema e da casca, influenciam na decisão de compra por meio de uma pesquisa com consumidores. A pesquisa com consumidores foi composta por informações de 1.567 indivíduos respondidos de diferentes regiões, sexo, renda e níveis de escolaridade no Brasil. A opinião dos participantes foi avaliada por meio de associações livres de palavras, relacionadas às preferências pelas características físicas dos ovos. Em seguida, os indivíduos foram solicitados a responder perguntas relacionadas às suas preferências em relação às características visuais, principalmente a cor da gema e da casca do ovo. Parcela

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Single and split nitrogen application on the forage yield, morphogenesis, chemical composition, and tissue nitrogen fractions of *Cynodon nlemfuensis* under mob grazing

Aplicação de nitrogênio em dose única ou parcelada na produção de forragem, morfogênese, composição química e frações de nitrogênio tecidual de *Cynodon nlemfuensis* sob pastejo

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Highlights

Nitrogen fertilizer in single application increased forage yield production.
The leaf appearance rate and total green blade increased in single application.
Climatic conditions and vegetative phase alter forage morphology.
Split the nitrogen fertilizer does not change the chemical composition.

Abstract

The aim of this study was to evaluate the forage production, nutritional value (including protein fractions), and morphogenic characteristics of African star grass on nitrogen fertilizer in a single application and split applications of two and four, under mob grazing. The study was conducted on a 1.5 ha area with well-established African star grass (*Cynodon nlemfuensis*). The area was divided into 18 paddocks of 400 m^2. for three treatments and six replications that were assigned through a randomized block design. The treatments were: Nap1 =Single N application; Nap2= split into two N applications; and Nap4: split into four N applications. Fertilizer application was 200 kg ha^{-1} of N in topdressing. Pasture was monitored weekly by sward height. Grazing began when the forage reached between 25 and 30 cm in height and ceased at 10 cm. In almost

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Chemical compounds and gas production kinetics of annual ryegrass hay in distinct nitrogen levels and cutting heights

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Abstract: The aim of our work was to evaluate the chemical composition and cumulative gas production profiles of annual ryegrass hay through in vitro incubations for two cutting heights and different nitrogen fertilization doses. The experimental design was randomized blocks with split-plots. The nitrogen doses (0, 75, 150, and 225 kg N ha^{-1}) were distributed in the main plot and the subplots. To make the hay, the annual ryegrass was cut at heights of 5 and 10 cm from the ground, with three replications each. In the experimental area, corn was cropped in the summer and annual ryegrass pasture in the winter. We evaluated the nutritional compounds, with fractionation of protein and carbohydrate content as the kinetics of ruminal degradation in the gas production technique in vitro. The carbohydrates decreased linearly with the increasing levels in N, as well as the kinetic parameters. Protein fractions increased with the increase in N. A higher nonfibrous content was obtained at a cutting height of 10 cm. Regardless of the cutting height, nitrogen fertilization increased the crude protein content and decreased the total carbohydrates content, especially the nonstructural carbohydrates. The increase of N in the plant decreased the specific rate of gas production due to the degradation of the soluble fraction of rapid digestion and caused a decrease in gas production of the slow digestion fraction.

Key words: Haymaking, kinetics parameters, *Lolium multiflorum* Lam., winter grasses

1. Introduction

In temperate regions, the use of winter grasses is a strategy to minimize the climatic effects on the production systems of animals on pasture due to their characteristics of adaptation to subtropical climates, as they show peak mass production in cold weather. [1]. Thus, annual ryegrass (*Lolium multiflorum* Lam.) is a winter grass used primarily as pasture, silage, and hay, but also as a good source of protein, and for its several benefits due to its versatility of use. With climate changes, it is not always possible to provide a feed that meets the animals' requirements for long periods, mostly during winter. Thus, an alternative to this problem is the production of hay, a technique that requires proper handling and fertilization to generate a good-quality product. The cutting height of the plant can influence the nutritional values of the hay, as it affects the production of dry matter, lignin, and fiber content [2,3].

Another aspect to be observed is the nitrogen content. Being part of the chemical composition of biomolecules such as ATP (adenosine triphosphate), electron transporters (NADH, NADPH), chlorophyll, proteins, and also some enzymes, nitrogen is an essential element for plants. [4]. Nitrogen fertilization provides gain in forage mass and increased availability of dry matter for animal intake. The optimization of the use of nitrogen through the efficiency of the plant in absorbing what is being supplied results in higher leaf production and lower stem production, which favors the increase of forage protein content.

Within animal production systems, the knowledge about protein degradation is indeed important for ruminants, because they can produce microbial protein which is directly linked to the dietary N source. Measuring the protein content in diets and its fractions is necessary to understand how the nitrogen uptake from forage behaves inside the rumen. However, little is known about the nutritional details of ryegrass hay of different doses of nitrogen fertilization and harvest at different heights. Considering the influence of nitrogen on plants and also on ruminal fermentation, the aim of our work was to evaluate the chemical composition and in vitro ruminal kinetics of annual ryegrass hay from two cutting heights and grown with different doses of nitrogen fertilization.

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B2

BIOSCIENCE JOURNAL

HONEY CONSUMER'S PERCEPTION: ARE BRAZILIAN CONSUMERS FAMILIAR WITH STINGLESS BEE HONEY?

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Abstract

Stingless bees have a fundamental important role in the economies and traditions of South America indigenous cultures. Are mainly responsible for the pollination of several plant species. This way, the aim was to identify if Brazilian consumers know stingless bee honey and its sensorial characteristics, what is the consumption of this, as well as to generate information to assist in the development of the productive chain of the specie. A closed structured questionnaire with 20 questions was used and the participants were invited via social media. Data were collected in November 2020. The statistical analyses were performed related to the description, characterization of the participants and frequencies. In addition to these,, multivariate analyzes, for word association and questionnaire responses were performed. It is clear that most participants have some confusion between the sensory and physical characteristics of honey from native stingless bees and *Apis mellifera*. This lack of knowledge of the product can cause problems both in the handling of honey for sale and for consumption. Another interference would be linked to the taste, when we highlight the acidity and less sweetness of this pot-honey, and the consumer can often deduce that the product is damaged or not from a good origin. There is little consumer awareness of the benefits and qualities of stingless honey. Many consumers are still unaware of the differences between breeding sites and characteristics of native stingless bees. Still, a large part of these associates the quality of this honey with the honey of *Apis Mellifera*.

Keywords: Health assessment. Human nutrition. Perception profile. Wild bees. Wildlife conservation.

1. Introduction

Brazil has a wide variety of native stingless bees (*Meliponini*, *Apidae*, *Hymenoptera*), and these insects are mainly responsible for the pollination of several plant species (Garibaldi et al. 2013), directly impacting on food production. Stingless bees played a fundamental important role in the economies and traditions of American indigenous cultures (Quezada-Euán et al. 2018) and now its commercial activity is in full growth in Brazil, with the discovery of “new” species to produce honey.

B4

BIA
BOLETIM DE INDÚSTRIA ANIMAL

ANIMAL NUTRITION

CHARACTERIZATION AND POTENTIAL USE OF OLIVE PIES FROM DIFFERENT EXTRACTIONS AND INDUSTRIES IN RUMINANT FEEDING

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Abstract

This work aimed to characterize coproducts from extra virgin olive oil extraction, its chemical composition and nutritive value of two olive cultivars (Arbequina and Koroneiki) in industries in Brazil Southern region. Sampling from cultivar Arbequina was done at two moments (time 0 and 48h post processing) and from cultivar Koroneiki, only at time zero was sampled. The composition of the two cultivars was different, as expected. Higher levels of carbohydrates (CHO) and lower levels of neutral detergent fiber (NDF) contributed to improve in situ degradability (61.0 vs 43.5%) of Koroneiki cultivar. Both co-products obtained on the day of processing showed high levels of lignin, which led to a lower level of in situ degradability of the NDF (21.1%). High levels of EE (19.4% DM), total phenols (FT; 1.8% DM), total tannins (TT; 1.11% DM) and TDN (72.7% DM) were also observed. These results demonstrate that the byproduct represents a potential source of lipids and phenolic compounds that can be used to adjust diets as well as the aggregation of functional molecules in meat and milk products. The care in obtaining and preserving the product is important because the material obtained 48 hours after the processing showed losses in the contents of CHO, CNF, FT and TT, which can impair its nutritional value and the potential of use.

Keywords carbohydrate fractions, co-products, lipids, *Olea europaea* L., phenolic compounds

CARACTERIZAÇÃO E POTENCIAL DE UTILIZAÇÃO DE TORTAS DE OLIVA PROVENIENTES DE DIFERENTES EXTRAÇÕES E INDÚSTRIAS NA ALIMENTAÇÃO DE RUMINANTES

Resumo

O objetivo foi caracterizar coprodutos da extração do azeite de oliva extravirgem, sua composição química e valor nutritivo de duas cultivares de azeitona (Arbequina e Koroneiki) de indústrias do sul do Brasil. As amostras do cultivar Arbequina foram realizadas em dois momentos (tempo 0 e 48h pós-processamento) e da cultivar Koroneki somente no tempo 0. Níveis superiores de carboidratos (CHO) e os menores de fibra em detergente neutro (FDN) contribuíram para melhorar degradabilidade *in situ* (61,0 vs 43,5%) da cultivar Koroneiki. Ambos os subprodutos obtidos no dia do processamento apresentaram altos teores de lignina, o que ocasionou um menor teor da degradabilidade *in situ* da FDN (21,1%). Também foram observados altos teores de EE (19,4% MS), fenóis totais (FT; 1,8% MS), taninos totais (TT; 1,11% MS) e NDT (72,7% MS). Esses resultados demonstram que o subproduto representa uma fonte potencial de lipídios e compostos fenólicos que podem ser utilizados para adequação de dietas, bem como agregação de moléculas funcionais em carnes e produtos lácteos. O cuidado na obtenção e conservação do produto é importante, pois o material obtido 48 horas após o processamento apresentou perdas nos teores de CHO, CNF, FT e TT, o que pode prejudicar seu valor nutricional e o potencial de aproveitamento.

Palavras-chave compostos fenólicos, coprodutos, frações de carboidratos, lipídios, *Olea europaea* L.

BIA
BOLETIM DE INDÚSTRIA ANIMAL

ANIMAL NUTRITION

EXPELLER SOYBEAN MEAL: EVALUATION OF HOLSTEIN COW PRODUCTION AND IN VITRO RUMINAL KINETIC

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Abstract

We aimed to evaluate the inclusion of expeller soybean meal on the quality and milk production of Holstein cows, as well to estimate and compare the inherent parameters of the *in vitro* ruminal kinetics. Data collection was carried out on a private property, in the interior of the municipality of Dois Vizinhos - Paraná, Brazil. Twenty Holstein cows were used, divided into two treatments: one with the inclusion of expeller soybean meal and the other with conventional soybean meal. The design used was completely randomized with parity. Milk production was evaluated through weighing. Milk samples were collected on days 0, 15, 30 and 45 to evaluate the milk protein, fat, urea nitrogen, lactose and total solids. The *In vitro* ruminal kinetics of convencional and expeller soybean meal was performed at the Universidade Tecnológica Federal do Paraná – Paraná, Dois Vizinhos. The gas pressure and volume measures were taken after 1, 2, 3, 6, 8, 10, 12, 16, 20, 24, 30, 36, 48 and 72 hours of sample incubation. The results obtained were applied in a two-compartmental mathematical model with no latency time in the first compartment for description of ruminal kinetics. Data were analyzed by variance (ANOVA) and compared by the F test. There was no significant difference in any of the variables evaluated from mil production and quality when soybean meal expeller was included in the animals' diet (P>0.05). The expeller soybean meal showed a lower degradation compared to the conventional meal. There were no significant differences for milk production as for concentration of solids in milk.

Keywords Protein degradability, protein sources, milk fat, rumen, undegradable protein.

FARELO DE SOJA EXPELLER: AVALIAÇÃO DA PRODUÇÃO DE VACAS HOLANDESAS E CINÉTICA RUMINAL *IN VITRO*

Resumo

O objetivo foi avaliar a inclusão do farelo de soja expeller na qualidade e produção do leite de vacas holandesas, assim como estimar e comparar os parâmetros inerentes a cinética ruminal *in vitro* do farelo de soja convencional e expeller. A coleta de dados a campo foi realizada em propriedade particular, no interior do município de Dois Vizinhos - Paraná, Brasil. Foram utilizadas 20 vacas holandesas, divididas em dois tratamentos: um com inclusão de farelo de soja expeller e o outro com farelo de soja convencional. O delineamento utilizado foi inteiramente casualizado com paridade. Foi avaliada a produção do leite através de pesagem diária. Amostras de leite foram coletadas nos dias 0, 15 e 30 para determinação de proteína, gordura, nitrogênio ureico, lactose e sólidos totais. A cinética ruminal *in vitro* do farelo de soja convencional e farelo de soja expeller foi realizada na Universidade Tecnológica Federal do Paraná, campus Dois Vizinhos. As leituras de pressão e volume foram realizadas após 1, 2, 3, 6, 8, 10, 12, 16, 20, 24, 30, 36, 48 e 72 horas de incubação. Os resultados obtidos foram aplicados em modelo matemático bicompartimental sem latência no primeiro compartimento para descrição da cinética ruminal. Os dados foram submetidos à análise de variância (ANOVA) e comparados pelo Teste F. Quanto a produção e qualidade do leite, não houve diferenças significativa para as variáveis avaliadas quando incluído o farelo de soja expeller na dieta dos animais (P>0,05). O farelo de soja expeller apresentou uma degradação inferior comparada ao farelo convencional. Não houve diferenças significativas para a produção de leite como para a concentração de sólidos no leite.

Palavras chaves degradabilidade proteica, fontes proteicas, gordura do leite, proteína não degradável no rúmen.

Livro conforme área pretendida

Ana Carolina Fluck
Olmar Antônio Denardin Costa
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(Orgs.)

NUTRIÇÃO ANIMAL

NOVAS PERSPECTIVAS E AVANÇOS PARA A SUSTENTABILIDADE E OTIMIZAÇÃO DOS SISTEMAS DE CRIAÇÃO

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