possible mitigation of emissions from sheep when compared with the grazing of conventional, senesced annual pastures. There is a lack of emission data from cattle, which is important to identify possible differences in the utilisation of shrubs when compared with sheep. The aim of this project was to quantify herd scale enteric methane emissions from cattle grazing pastures containing browse shrubs compared to grass pastures, as part of the Shrubs for Emission Reduction and Carbon Storage (SERCS) project. Black Angus (Bos taurus) heifers (mean live weight (LW) 306 kg) were allocated to two grazing treatments; SERCS1- grass pasture only and SERCS2- grass pasture with perennial shrubs; and allowed continuous access to these pastures throughout the measurement period. Herd scale methane measurements were conducted daily for 28 days using open path lasers, when animals were confined to known source areas which aligned with normal grazing-resting behaviours. Average daily LW gain was 0.37 kg/d for SERCS1 compared with 0.20 kg/d for the SERCS2 group. Mean methane emissions (g/d) were generally similar between groups and only during the third week of measurements did the SERCS2 heifers demonstrate a decrease in methane emissions compared with the SERCS1 group. Overall, the SERCS1 group were shown to have mean methane emissions of 116.4 compared to 123.3 g/d animal-1 for the SERCS2 animals. On an emissions intensity basis these values are equivalent to 7.6 and 8.3 g CO2-e/kg LW, respectively. The data reported here indicates that herd scale methane emissions are similar for cattle grazing grass pastures with and without perennial shrubs, despite earlier work suggesting that shrubs would mitigate emissions in a grazing environment. Factors that may have influenced these results have been identified.

PO179

PREDICTING EFFECTS OF CATTLE GROWTH PROMOTING TECHNOLOGIES ON METHANE EMISSIONS USING TAURUS RATION FORMULATION SOFTWARE

James Oltjen[1], Ermias Kebreab[1], Abbas Ahmadi[1]

1 Department of Animal Science, University of California, Davis, 95616, USA

Beef cattle contribute to global warming by releasing methane (CH4) gas through enteric fermentation. The amount of CH4 produced by beef cattle is largely a function of feed intake and chemical composition of the feed. TAURUS is a beef cattle ration formulation and performance prediction computer program that predicts CH4 emissions. Climate change effects on cattle intake and heat production and animal maintenance energy are accounted for by TAURUS. This gives the user of TAURUS a tool to formulate several least cost rations and the option to select one with low methane emission. Methane emission is calculated using the diet's gross energy, dry matter (DM) intake, and body weight. Body weight is provided by the user, but gross energy and DM intake are calculated by TAURUS. We estimated the effects of growth promoting and nutrient partitioning agents on performance and CH4 production in feedlot cattle. For Angus crossbred steers, TAURUS predicted (over the entire feeding period) and observed (13 d prior to slaughter) CH4 emissions (g per d) were 207 and 266 for controls; 202 and 239 for those fed 33.1 mg monensin and 12.2 mg tylosin phosphate per kg DM; and 209 and 273 for those fed monensin and tylosin phosphate and implanted with 120 mg trenbolene acetate and 24 mg estradiol, respectively. Thus, the TAURUS predicted effects of the growth promoting technologies were similar in direction to those observedâ€"CH4 emissions were reduced for monensin/tylosin and increased for steroidal implants, but of smaller magnitude. The results can help beef cattle producers to implement dietary strategies to decrease CH4 emissions from cattle. Mitigating CH4 losses from cattle will result in a long-term environmental benefit by decreasing agriculture's contribution to greenhouse gas emissions.

PO180

METHANE PRODUCTION IN SHEEP FED A SORGHUM SACCHARINE VARIETY ENSILED AT FOUR MATURITY STAGES

Thierry Tomich[2], Otaviano Pires Neto[3], Frederico Velasco[4], José Avelino Rodrigues[2], Diogo Jayme[3], Fernanda Machado[2], Mariana Campos[2], Ricardo Reis E Silva[3], **Luiz Gustavo Pereira**[2], Lúcio Gonçalves[3]

1 Support CNPq, Embrapa/Pecus-RumenGases Network, Fapemig
2 Brazilian Agricultural Research Corporation (Embrapa)
3 Universidade Federal de Minas Gerais, ,
4 Universidade Federal de São João Del-Rei

The sweet sorghum variety BRS 506 was selected for ethanol production by the Brazilian National Alcohol Program, but high productivities and forage quality has led to an increased use in silage production. This study was undertaken to evaluate the effect of harvesting this variety of sorghum at 7, 14, 21 or 28 d after the full bloom on voluntary intake, dry matter digestibility (DMD) and methane (CH4) productions by sheep fed the silage. Rams (n = 20, 46.0 ± 1.2 kg of body weight - BW) were adapted to silages for 21 d after which intake and digestibility were measured over 5 d in a completely randomized design. Methane emissions from each ram were measured in a respiration chamber over 22 h. When there was an effect (P?0.05) of plant maturity stage, orthogonal polynomials were performed to determine if stage of maturity resulted in a linear, quadratic or cubic effect on measured parameters. Dry matter intake (DMI) of silages linearly decreased (P=0.04) from 52.1 to 46.4 g kg-

1 BW0,75 d-1, but DMD was not influenced (P>0.05) by increasing maturity stage (552.5 ± 8.9 g kg-1). Digestible DMI varied from 24.7 to 33.5 g kg-1 BW0,75 d-1 and presented a cubic response (P=0.01) in function of increasing plant maturity stages, with the higher coefficient observed for silage produced 14 d after the full bloom. Daily CH4 productions (329 to 263 mg Kg-1 BW d-1) linearly decreased (P<0.01) with increasing maturity stage, but were not affected (P=0.14) by DMI (15.0 ± 0.5 g kg-1). However, CH4 productions per digestible DMI (23.2 to 30.7 g Kg-1 digestible DMI) presented a cubic response (P=0.04) with the lower value for silage produced 14 d after the full bloom. Ensiling of this variety of sorghum about 14 d after the full bloom can contribute to improved animal performance and reduced CH4 production.

PO181

EMISSION INTENSITY BASED ON LIFETIME MILK PRODUCTION OF DAIRY ANIMALS AND IMPACT OF RATION BALANCING

Manget Ram Garg[1], Pankaj Sherasia[1], Bhupendra Phondba[1], Harinder Makkar[2]

1 National Dairy Development Board, India
2 Food and Agriculture Organization of the United Nations, Italy

Smallholder dairying in India relies on low and medium productive animals, and their nutrition is mainly based on crop residues and other agro-industrial by-products. The diets are generally nutritionally imbalanced, resulting in high age at first calving, short lactation length and high number of unproductive animals. This also impacts negatively on emission intensity (Ei). Emission intensity can be reduced by increasing animal productivity and longevity. During the last three years, the National Dairy Development Board of India has implemented a large scale Ration Balancing (RB) programme on dairy farms. The effect of feeding a balanced ration on Ei was explored. A birth to farm-gate partial life cycle assessment (LCA), taking into account the lifespan milk production, was conducted in 163540 cows and 162960 buffaloes throughout India. The LCA boundary included feed production, enteric fermentation and manure management during various stages of life (birth to heifer, lactation, dry period and unproductive stage). The allocation was based on digestibility, price and mass. Based on economic allocation, feed production, enteric fermentation and manure management contributed: 17.9, 73.9 and 8.2%; and 10.9, 80.1, 9.0% to the baseline (before RB) lifetime greenhouse gas (GHG) emissions in cows and buffaloes, respectively. Average Ei on digestibility, economic and mass allocation for 'baseline vs. after RB' were: 1.35 vs. 0.79, 1.28 vs. 0.75 and 1.46 vs. 0.84 kg CO2-equivalent/kg fat and protein corrected milk (FPCM) in cows and 2.05 vs. 1.10, 1.95 vs. 1.04, 2.23 vs. 1.18 kg CO2-equivalent/kg FPCM in buffaloes. The RB improved milk production and net daily gain by Rs. 20 (~30 US$ cent) per animal. Feeding balanced rations reduced Ei of milk on lifetime basis by 41.8 and 46.7% in cows and buffaloes, respectively. Implementation of RB programme at smallholder farms has potential to provide 'triple wins' desired simultaneous economic, environment and social outcomes. Key words: Emission intensity, Greenhouse gas, Life cycle assessment, Ration balancing, Sustainability

---

PO182

BENEFITS OF INCLUDING METHANE MEASUREMENTS IN THE BREEDING OBJECTIVE FOR CATTLE AND SHEEP

Dorothy Robinson[1], Hutton Oddy[1]

1 NSW DPI

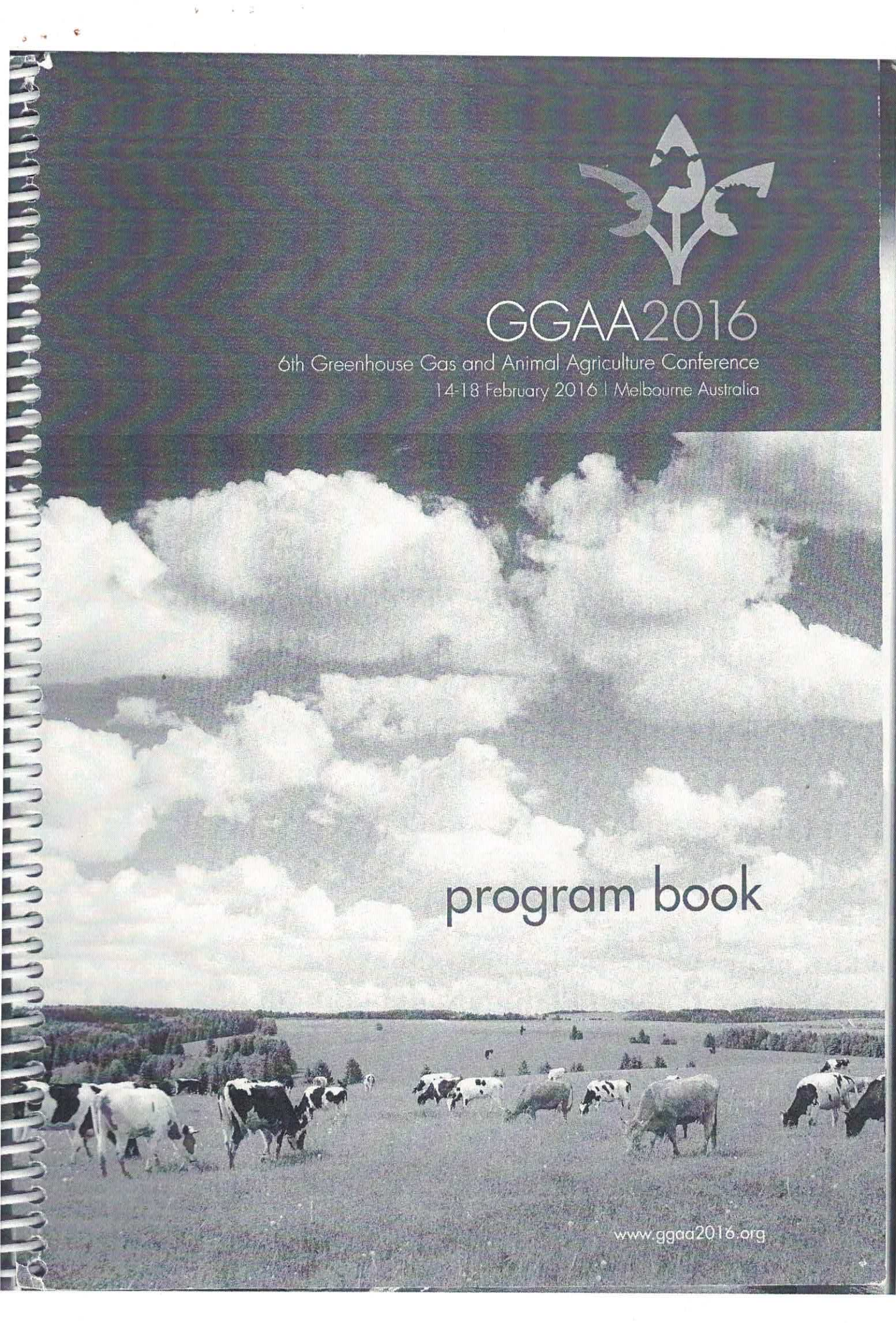
Estimated genetic/phenotypic covariances, economic values for slaughter-weight, growth, feed intake/efficiency, and three potential methane traits were compiled to explore the effect of including methane in the breeding-objective for cattle and meat-sheep. Methane was assumed to cost A) zero, B) A$476/tonne (based on $14/tonne CO2-equivalent and methane's 100-year Global Warming Potential (GWP) of 34) or C) A$2,580/tonne ($30/tonne CO2-equivalent combined with methane's 20-year GWP of 86). Methane traits were: methane-yield (MY, methane production divided by feed intake, based on 1-day measurements in respiration chambers), or short-term measurements of methane production at pasture, adjusted for liveweight (MPadjWt), e.g. 40-60 minutes in portable accumulation chambers (PAC) on 1 or 3 occasions, or 1 week of Greenfeed Emissions Monitor (GEM) measurements on 1 or 3 occasions. Feed costs were calculated for growth from weaning to slaughter, and for maintaining the breeding herd. Pasture was assumed to cost A$50/tonne DM. Cattle were assumed to average 100 days feedlot-finishing (A$300/tonne DM). For cattle, 3 GEM measurements increased estimated profit from 1 round of selection from A$20.69/head (no methane measurement) to A$26.93 (scenario A, zero methane cost) by limiting increases in feed costs while still increasing slaughter-weight. For 3 GEM measurements, profitability increased by A$7.16/head (scenario B) and A$12.09/head (scenario C). For sheep, 3 PAC measurements increased returns from A$5.06 (no methane measurements) to A$5.26 (scenario A), from A$4.85 to A$5.12 (scenario B) and from A$3.89 to A$4.72 (scenario C). The greatest benefit of including methane in the breeding-objective was as a proxy for feed intake. Including MY in the index was less profitable than MPadjWt because it did not reduce feed costs relative to weight-gain, so proportionately greater economic value was placed on increasing slaughter-weight. Consequently, decreased methane emissions (per head and per kg feed intake) were smaller for strategies

GGAA2016

6th Greenhouse Gas and Animal Agriculture Conference

14-18 February 2016 | Melbourne Australia

program book



www.ggaa2016.org