

**0396 Effect of high nutrient density diets on growth performance, feed efficiency, age at puberty, and feeding economics in Nili-Ravi buffalo heifers.**

M. Abdullah\*<sup>1</sup>, K. Javed<sup>1</sup>, Z. M. Iqbal<sup>1</sup>, M. Saadullah<sup>1</sup>, M. A. Jabbar<sup>1</sup>, and A. U. Haque<sup>2</sup>, <sup>1</sup>University of Veterinary and Animal Sciences, Lahore, Pakistan, <sup>2</sup>Buffalo Research Institute, Pattoki, Pakistan.

Traditional buffalo raising becomes uneconomical due to poor growth and delayed age at puberty. The feeding trial was conducted to evaluate the feeding diets with varying nutrient density on dry matter intake, growth rate, age at puberty, feed efficiency, and feeding economics in Nili-Ravi buffalo heifers. Thirty Nili-Ravi buffalo heifer calves between the age of 5 and 7 mo and approximately of 95 kg body weight were assigned to 3 different treatments: (A) Control (CP and ME at NRC, 2001), (B) CP and ME contents at 20% above, and (C) CP and ME 40% above NRC recommendations. The experiment continued until manifestation of puberty signs (mucous discharge) in all 3 treatment groups. The data were analyzed using SAS 9.1 (SAS Inst. Inc., Cary, NC). Dry matter intake was different ( $P < 0.05$ ) among the treatment groups:  $6.71^a \pm 2.69$ ,  $7.99^b \pm 3.28$ , and  $9.11^c \pm 3.90$  kg for Treatments A, B, and C, respectively. The average daily CP and ME intake was also different ( $P < 0.05$ ):  $876.03^a \pm 348.38$ ,  $1094.43^b \pm 445.84$ , and  $1285.98^c \pm 546.62$  g CP, and  $15.36^a \pm 6.12$ ,  $18.83^b \pm 7.69$ , and  $21.85^c \pm 9.31$  Mcal/kg ME for Treatments A, B, and C, respectively. There was no difference in the average daily gain of Treatments A and B ( $525.88^a \pm 292.92$ ,  $551.98^a$  g), while Treatment C ( $612.99^b \pm 350.17$  g) gained higher as compared with other 2 treatment groups. The feed efficiency of Treatment A ( $0.093^a \pm 0.06$ ) was higher as compared with Treatments B and C ( $0.081^b \pm 0.05$  and  $0.081^b \pm 0.05$ ). The mean body length ( $111.98^a \pm 12.79$  and  $111.35^a \pm 13.61$  cm) and heart girth ( $142.22^a \pm 21.27$  and  $142.89^a \pm 22.71$  cm) was same in Treatments A and B, while different in Treatment C ( $113.07^b \pm 14.29$  cm) and ( $144.39^b \pm 23.71$  cm). The height at wither was higher in Treatment C ( $116.20^b \pm 13.18$  cm) as compared with Treatment A, whereas it was similar between Treatments A and B, and B and C ( $117.07^a \pm 12.61$  and  $116.68^{ab} \pm 12.99$  cm for Treatments A and B, respectively). There was no difference in the mean age at puberty of all the 3 treatment groups ( $733.11^a \pm 50.55$ ,  $716.78^a \pm 33.65$ , and  $723.50^a \pm 26.31$  d) while weight at puberty was same for Treatments A and B ( $384.87^a \pm 30.47$  and  $398.40^{ab} \pm 35.92$  kg) and between B and C ( $423.90^b \pm 30.12$  kg). The averaged daily feeding cost was lower in Treatment A (Rs. 139.93a  $\pm$  28.27) as compared with Treatments B (Rs. 195.12<sup>b</sup>  $\pm$  41.92) and C (Rs. 246.25<sup>c</sup>  $\pm$  56.39). Buffalo heifers were found to

be efficient converters and economical to raise on low-nutrient-density diet without affecting their age at puberty.

**Key Words:** Nili-Ravi buffaloes, age at puberty, nutrient density

**0397 Environment concerns and waste management strategies of pig production in China.** J. Peng\*<sup>1</sup>,

L. Liu<sup>2</sup>, and L. Huang<sup>1</sup>, <sup>1</sup>Jiangxi Agricultural University, Nanchang, China, <sup>2</sup>Jiangxi Department of Agriculture, Nanchang, China.

With the largest population in the world, the Chinese government continues to stimulate pork production to meet the increased demand for protein consumption. However, the increases in hog population and density have created various environmental problems in China. One of the issues is that it can cause water and land contamination when farm wastes being handled incorrectly. Most recently, China published the most updated waste management regulation for animal industry, effective from January 1, 2014. Waste management has become an important focus for swine industry in China. The objective of this study was designed to assess waste streams in pig production under the most current situation in China. Commercial pig farms ( $n = 50$ ) were chosen from 11 different provinces, representing the major area of swine production in China. The size of the pig farm ranges from small, medium, and large. Data was collected through farm visit (and/or farm inspection), personal interview, focus group, meeting discussion, survey questionnaire, and farm document review. A group of Chinese swine experts, including central and local government officers, as well as educators and researchers from different universities and institutes, was selected to verify data and acquire data consensus. This study finds that daily manually scraping of pig pens, along with floor water-line flushing is a common method for solid manure collection and pen hygiene. However, the continuously increasing human labor cost in pig production has forced the solid manure collection method to change from manual to automatic. In addition, the usage of concrete slatted floors to avoid daily manually scraping and flushing is becoming more accepted. Moreover, to reduce the volume of farm slurry, newly designed farms commonly utilize underground pipe for slurry collection and to avoid mixing rainwater. This study also finds the currently government-sponsored anaerobic digester project, promoted as a method of treating slurry, is rarely found to be successful at large-scale intensive pig farms. Consequently, the Chinese government should take serious actions to enforce the disposing of farm waste in a more sustainable and environmentally friendly approach, such as compost and use in an organic fertilizer plant. In conclusion, waste water increases manure volume, which in turn may increase the cost of manure storage and distribution or increase the cost of treatment if to meet the emission standards. Therefore, pig farms should adopt new equipment and innovative technology to avoid wa-

ter wastage, as well as implement novel waste management methods to support sustainability.

**Key Words:** environment concerns, waste management, sustainability

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**0398 Identification of barriers of Bahamian agriculture production: An assessment of stakeholder needs.**

S. J. Trojan\*<sup>1</sup>, M. T. Brashears<sup>2</sup>, S. Morales<sup>2</sup>, A. Echeverry<sup>1</sup>, and M. Brashears<sup>1</sup>, <sup>1</sup>*Texas Tech University, Department of Animal and Food Sciences, Lubbock*, <sup>2</sup>*Texas Tech University, Department of Agriculture Education and Communications, Lubbock*.

Land available for agriculture production in the Bahamas is roughly 191,000 acres; however, approximately 10% of production capacity is realized. To assist with augmenting Bahamian agriculture production, a team of Texas Tech University researchers worked with the Inter-American Institute for Cooperation on Agriculture (IICA) to evaluate the Bahamian food system from farm to fork to determine stakeholder needs. The team traveled to several islands; visited multiple farms, governmental agencies, a feed mill, an abattoir, a resort butcher department, and met with the Minister of Agriculture. At each stakeholder meeting, barriers to the food production and consumption system were identified. The following themes emerged within respective segments. Issues producers faced included: (1) lack of product standards and certification; (2) theft and feral dogs; (3) inconsistent availability and price of inputs; (4) land availability; and (5) unfair trade regulations. Processors indicated the following barriers: (1) lack of access to employee training; (2) equipment availability and cost; (3) consistency of governmental support; and (4) facility security. The team also conducted a workshop for livestock producers and administered an instrument to help identify audience demographics and major concerns with Bahamian agriculture production. Of the 25 individuals that responded, 50% indicated that agriculture represented 50% of household income, whereas 10 individuals indicated agriculture was the sole income source. For such households, challenges within the agriculture system can lead to significant levels of food insecurity. The instrument also identified the following challenges within the agriculture industry: lack of education in food safety, governmental challenges, lack of marketing infrastructure, and a need for new technologies and methodologies for improving agriculture productivity, transportation and handling, and animal welfare. The needs assessment conducted by the research team was the initial step in communicating barriers the country faces in becoming more food secure to IICA. Researchers made several recommendations to IICA to focus stakeholder resources. Educational efforts must be coordinated through

IICA and governmental agencies to provide effective training programs and eliminate redundancy. Communication at all levels of government related to food production and consumption should be improved. The single abattoir on the island of New Providence should be evaluated for feasibility of continued operations or elimination. Alternatives for providing humane animal slaughter in multiple locations were proposed with the goal of improving processing quality to World Trade Organization food safety guidelines. Efforts to open an agricultural branch of the College of the Bahamas on Andros Island should be strongly supported.

**Key Words:** Bahamas, food security, needs assessment

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**0399 Diet-induced shifts in the rumen microbiome of Mehshana buffalo (*Bubalus bubalis*).**

D. W. Pitta<sup>1</sup>, S. Kumar\*<sup>1</sup>, B. Veiccharelli<sup>1</sup>, N. Parmar<sup>2</sup>, and C. Joshi<sup>2</sup>, <sup>1</sup>*University of Pennsylvania, Kennett Square, PA*, <sup>2</sup>*Anand Agriculture University, Anand, India*

We investigated the diet-induced shifts in the microbiome of both solid and liquid ruminal fractions retrieved from water buffalo utilizing 16S rRNA pyrosequencing technology. The depth of coverage of metabolically active bacteria in a community using different primer pairs was also determined. To assess reproducibility, interanimal variation was considered in all phylogenetic and community comparisons. The experiment included 4 nonlactating water buffaloes fed 3 different diets for 6 wk each; diets were M1 (50% concentrate: 50% dry roughage), M2 (25% concentrate: 75% dry roughage), and M3 (100% dry roughage). A total of 333,851 pyrotags were analysed in this study. Phylogenetic analysis revealed significant differences in the rumen microbiome mediated by primer and diet ( $P < 0.05$ ). Differences in community composition due to primer, diet, fraction, and animal were compared using unweighted and weighted UniFrac analysis. Clustering of communities was largely explained by primer differences in both weighted and unweighted UniFrac analyses ( $P < 0.001$ ). In the weighted analysis, communities clustered by diets ( $P < 0.05$ ) and fractions ( $P < 0.08$ ) while no interanimal variation was observed. The identified repertoire of bacterial populations was dependent on the primer pair, as targeting the V4-V5 region resulted in greater diversity profiles of the microbiome. Within each primer pair, dietary changes altered the community composition with noticeable shifts at the genus level. Genera such as *Ruminococcus* and *Fibrobacter* ( $P < 0.05$ ) were higher in abundance on M3 diet, while *Prevotella* dominated ( $P < 0.05$ ) on the M1 diet.

**Key Words:** rumen bacterial community, hypervariable regions, UniFrac analyses