

as a method to lower feed costs. However the effect of dietary restriction and subsequent re-alimentation on an animal's health status has not been reported. The objective of this study was to assess the health status of animals undergoing dietary restriction and subsequent re-alimentation induced compensatory growth through haematological analysis. For this, sixty Holstein Friesian bulls were assigned to one of two groups: restricted feed allowance (RES; n=30) for 125 days (Period 1) followed by *ad libitum* access to feed for 55 days (Period 2) or (ii) *ad libitum* access to feed throughout (ADLIB; n=30). Blood samples were collected into K₃EDTA tubes through jugular venepuncture on days 1, 25, 55, 93 and 125 of Period 1, and on days 7, 18, 33 and 53 of Period 2. Whole blood samples were immediately analysed after collection using an ADVIA 2120 analyser (Bayer Healthcare, Siemens, UK), which contained appropriate software for the analysis of bovine blood. Data were statistically analysed using the Mixed procedure of SAS. There were no differences apparent in lymphocyte, monocyte, eosinophil, leukocyte and basophil numbers between RES and ADLIB treatment groups during Periods 1 and 2. Neutrophil numbers were higher in RES compared to ADLIB ($P = 0.0002$) after one day of dietary restriction in Period 1, but were not different for any remaining sampling time-points. Higher neutrophil numbers in RES animals following one day of dietary restriction may represent acute physiological stress as a consequence of dietary restriction, however the lack of subsequent differences in neutrophil numbers and other immune cells between treatment group suggests no lasting negative effects of a moderate dietary restriction on an animals health status.

Key Words: compensatory growth, immune status, cattle

PSX-7 Differences of the carcass and non-carcass traits between divergent groups for residual feed intake in water buffaloes. A. de Castilhos, C. Francisco, A. Jacaúna, F. de Barros, D. Marques da Silva, A. Aranha, P. Meirelles, A. Jorge, *Sao Paulo State University / School of Veterinary Medicine and Animal Science, Sao Paulo, Brazil*

The objective of this study was to evaluate differences between carcass and non-carcass traits and residual feed intake (RFI) of water buffaloes (*Bubalus bubalis*). Efficiency tests were performed in two-years of studies (2016 and 2017) in 173 non-castrated males (360 ± 77 kg of initial BW) of 3 genetic groups (GG): Jafarabadi (n = 53), Mediterranean (n = 60), and Murrah (n = 60).

Animals were allocated during 84 days in collective feedlot pens equipped with automatic feeders and water trough (Intergado, Minas Gerais, Brazil). Residual feed intake was determined as the difference between the observed and predicted feed intake of the animals based on its metabolic BW and ADG. After the efficiency tests, animals were classified as Low (<0.5 SD mean; more efficient; n=36) and High (>0.5 SD mean; less efficient; n=42) RFI groups, and selected for measurement of the carcass and non-carcass traits. Data were analyzed using the MIXED procedure (SAS Inst. Inc., Cary, NC) and the Satterthwaite approximation to determine the denominator degrees of freedom for the tests of fixed effects. The model statement included GG, RFI groups, and their resulting interactions as fixed effects. Interaction was not detected ($P > 0.10$) between GG and RFI groups, thus, results are presented according to RFI groups. There were differences between RFI groups ($P < 0.05$) for blood, liver, lungs, empty gastrointestinal tract, and kidney, pelvic, and heart (KPH) fat which suggest differences in tissue metabolic activities, resulting in a divergence in some traits between RFI groups (Table 1). Similarities were observed between RFI groups for hot carcass weight, dressing percentage, and carcass edible portion ($P > 0.10$) whereas the proportions of bone and trimmable fat differed ($P < 0.05$). In conclusion, divergent groups of residual feed intake evaluated in water buffaloes present differences regarding carcass and non-carcass traits.

Table 1. Carcass and non-carcass traits of divergent groups classified for residual feed intake in water buffaloes finished in feedlot.

Traits	RFI ^a		SEM	P-value
	High (n=42)	Low (n=36)		
RFI, kg/d	0.71	-0.69	0.12	<.001
Blood, kg	23.94	22.29	0.69	0.019
Liver, kg	6.50	6.05	0.16	0.008
Lung, kg	4.96	4.67	0.14	0.037
Other internal organs ^b , kg	12.00	11.93	0.55	0.900
Kidney, pelvic and heart fat, kg	25.85	21.62	1.07	0.000
Empty gastrointestinal tract, kg	41.85	38.10	1.12	0.001
Dressing percentage, %	49.48	49.51	0.28	0.909
Hot carcass weight, kg	286.25	278.64	4.69	0.109
Carcass edible portion, %	67.06	67.61	0.51	0.279
Total trimmable fat weight, %	15.02	13.48	0.52	0.004
Carcass bone, %	17.99	19.01	0.28	<.001

^aResidual feed intake - High (>0.5 SD mean) and Low (<0.5 SD mean);

^bOther internal organs: trachea, pancreas, esophagus, mesentery, tail, kidneys, heart, spleen, testicle, and penis;

Significance if $P < 0.05$.

Key Words: carcass traits, residual feed intake, water buffaloes

PSX-8 Use of anabolic implants in calves to increase weaning weight and backgrounding gains. B. Beer, G. Sell, S. Justice, J. Andrae, M. Miller, M. Burns, S. Duckett, *Clemson University, Clemson, SC, United States*

The objective of the this study was to determine how the use of anabolic implants in steer calves at 4 mo of age

and at weaning altered weight gain and price at marketing. Steers ($n = 160$) from two locations, Edisto REC and Simpson REC, were randomly allotted within 8 pasture replications to implant treatment: 1) no implant or 2) Ralgro implant at 4 mo of age plus Revalor-G implant at weaning. Steers were marketed into two groups, non-implanted and implanted, at the end of the 70 d backgrounding period. Weights were obtained at implanting, weaning and the end of backgrounding. Real-time ultrasound measures of ribeye area and fat thickness on a subset of steers ($n = 130$) were collected at the end of the backgrounding. Data were analyzed with treatment, location and the interaction in the model. Implanting increased ($P < 0.001$) average daily gains of the steer calves from implanting to weaning, weaning to end of the backgrounding, and overall by 86, 104, 91 g/hd/d, respectively. Implanting also increased ($P < 0.01$) ribeye area as measured by real-time ultrasound by 3.16 cm². Implanting did not alter ($P > 0.05$) fat thickness over the longissimus muscle as measured by real-time ultrasound. Weights and gains of the steers differed ($P < 0.01$) by location but there were no interactions ($P > 0.05$) between location and implant treatment. The use of anabolic implants in steer calves at 4 mo of age and again at weaning increases weight gain and produced heavier steers for marketing.

Key Words: Beef, calves, anabolic implants, growth

BIG DATA ANALYTICS

PSIII-24 Establishment of multilevel linear model and analysis of factors affecting piglet litter performance at birth in central China.

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This study aimed to establish a multilevel linear model and analyze the factors affecting piglet litter performance at birth. A total of 17,906 litter performance at birth from 16 commercial pig farms were collected from January 2010 to December 2012 in central China. The general linear regression model (PROC GLM), multilevel Poisson regression model (PROC GLMMIX and PROC NLMIXED), and multilevel linear model

(PROC MIXED) were established in SAS software to compare the goodness of fit among the three models. Results showed the ICC of total born piglet (TBP), piglet born alive (PBA), low birth weight piglet (LBW), and average birth weight (ABW) were 27.89%, 23.88%, 24.66%, and 22.27%, respectively ($P < 0.05$). The AIC, AICC, BIC, and -2LL in the multilevel linear models of TBP, PBA, LBW, and ABW were all lower than those in the general linear regression models. Moreover, the Pearson residuals of TBP, PBA, and LBW increased to nearly 1 after introducing discrete scale factor into models. The P values were all similar between the multilevel Poisson regression models and multilevel linear models for TBP, PBA, and LBW. Furthermore, multilevel analysis revealed the litter performance at birth was significantly influenced by management at farm level, and breed, parity, gestation diet, year, and season at litter level ($P < 0.05$). In conclusion, the multilevel linear model is better fit for the data of litter performance at birth than the general linear regression model. To simplify the analysis of discrete data, the multilevel Poisson regression model can be replaced by the multilevel linear model. Importantly, factors affecting litter performance at birth from the multilevel linear model provides valuable information on sow production management.

Key Words: data analysis, multilevel linear model, piglet performance

PSIII-25 Dairy Data: Challenges and Opportunities.

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Data on dairy animals are being generated under a wide variety of conditions (laboratory, research facilities, on farm). Each year, hundreds of research trials are carried out on the genetics, metabolism, nutrition, physiology and behavior of dairy animals. Furthermore, companies and manufacturers are producing various devices and sensors capable of automatically collecting data on farms. The capture, integration, and use of the information generated represents both a great challenge but also a tremendous opportunity to allow the sector to progress more effectively. Datasets collected in the field of dairy science are growing rapidly, and are expected to increase exponentially in size in the near future. Numerous phenotypes (immune responses, behavioral observations, nutritional information, bodily fluids such as milk, blood, rumen fluid, etc.) are being recorded. Various cost-effective information-sensing mobile devices are being implemented or will be implemented in the near future, including remote sensing, software logs, cameras,

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