Session 4: Communal range I

Chair: Brigid Letty

The impact of green innovations on sustainable livestock systems in communal rangelands

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The green village concept, whereby people have sustainable and affordable access to quality food, fodder, water and energy within a well-managed and functioning ecosystem, has the potential to provide basic services in remote and degraded areas of South Africa. As livestock production is already an important component of many smallholder farming systems, farmers need to develop innovative ways to capitalize on the use of low-cost natural resources to increase production. The aim of the current project was to develop technological alternatives for resource-poor farmers to promote better resource use through synergies between livestock, crops and water. This was achieved through the implementation of biogas (for energy and liquid fertilizer for food and fodder crops) and rainwater harvesting (for domestic use, fodder production and use in the biogas digester) at selected sites in the Upper Thukela. The primary domestic water source (34%) of 135 households interviewed in KwaZulu-Natal was a community tap stand, while 22% of households collected water from a stream. Firewood was the primary energy source (47.5%) followed by paraffin (25.8%) and electricity (21.7%). Biogas digesters were installed at four households in KwaZulu-Natal and were fed 20 l of water from roof-top rainwater harvesting and 20 kg of cow manure day^{-1}. This provided approximately two hours of burn time day^{-1} during summer (maximum production 37 l.kg^{-1}) and less than one hour in winter (minimum production 4 l.kg^{-1}). Experimental trials that were set up to estimate the effect of the bioslurry on maize yield indicated that there were no significant differences between the control (3.8 ton.ha^{-1}) and the bioslurry treatment (4.0 ton.ha^{-1}) compared to the fertilized treatment (7.2 ton.ha^{-1}). One option to reduce the severe degradation caused by daily livestock movement to high lying grazing areas is the implementation of a semi-zero grazing system. Here animals are kraaled for some of the time and allowed outside to graze at other times. Forage, which is grown near the homestead, is harvested and fed to the livestock to supplement their diet. Results of fodder trials showed no significant differences in the bioslurry, fertilizer and control treatments in cowpea and sorghum yield which ranged from 4.97 – 6.73 ton.ha^{-1} and from 3.75 – 5.47 ton.ha^{-1} respectively. However, Napier grass treated with bioslurry yielded 55% more herbage (25.9 ton.ha^{-1}) than the control (11.9 ton.ha^{-1}) and therefore had the most potential for a semi-zero grazing system. This project has demonstrated the potential for integrated natural resources management at the household level to be up-scaled for the development of a green village.

Keywords: semi-zero grazing, bioslurry, fodder yield

Assessing livestock farmers' understanding and adaptations to climate change in arid regions of South Africa

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African farmers are currently facing challenges of poverty, land use changes, land degradation, inappropriate local and national government policies, land ownership and finances, all of which affect their productivity and survival. Over the past few decades, the climate has been reported to be rapidly changing, thus adding to the already existing challenges that farmers experience. Climate change is known to mostly affect people who are dependent on natural resources for their livelihoods and live in remote areas. Communal livestock farmers in these remote areas are perceived to be uninformed about climate change. Furthermore, the applicability of the local ecological knowledge used by these farmers to adapt to change is noted to be slower than the rate at which climate is changing, thus posing an additional threat. This study attempts to examine these statements by assessing climate change knowledge, and adaptation strategies practised by communal livestock farmers in semi-arid regions of South Africa. The Leliefontein Communal Area in Namaqualand was chosen as the study site. Communal farmers have used these rangelands for centuries to raise livestock to sustain their livelihoods. To assess the farmers' knowledge, a focus group discussion (n=10) followed by in-depth semi-structured interviews with livestock keepers of different levels of farming experience (n=20) were conducted. Farmers reported that the term 'climate change' is new to them, but they are aware of the phenomenon and have been experiencing its effects for a long time. To provide a better explanation of their understanding of the phenomenon, farmers prefer to make use of the term 'seasonal change'. Farmers mentioned that their observed changes include shorter rainy winters with intense cold temperatures, while summers are prolonged with higher temperatures than in the past. Some adaptation measures to the observed changes include herd movements down the mountain during winter to evade cold conditions; and supplementary feed for livestock during extended dry summers and drought periods. However, the major finding of this study was that there are other threats apart from climate change farmers view need more urgent attention. The majority of farmers (70%) indicated that finances, access to land and water, road maintenance and youth involvement in agriculture seem to be immediate threats to their existence as communal livestock farmers; and thus need to be addressed immediately. For them to continue farming successfully in the future, they say climate change needs to be addressed in conjunction with these threats that hinder successful adaptation.

Keywords: climate change adaptation, communal rangelands, livestock farmers, local ecological knowledge, farmers' perceptions

Evaluating holistic management in Hwange Communal Lands, Zimbabwe: An actor-oriented livelihoods approach, incorporating everyday politics and resistance

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Rangelands in the semi-arid and arid regions of the world support livelihoods through their provision of multiple goods and services. Livestock production, for example, occurs in rangelands both as extensive ranching under freehold tenure and as collective ranching under communal tenure systems. However, the sustainability of rangelands is threatened and has been a major concern this century, leading to a variety of interventions. Holistic management (HM) is one such example, designed by its proponents as a panacea to halt degradation and, recently, climate change effects in the rangelands of Africa and beyond. HM has been implemented in the Hwange Communal Lands (HCLs) of Zimbabwe since 2010. In principle, the programme is aimed at restoring degraded watersheds and croplands through utilising properly managed livestock. To achieve this, two principles are promoted under HM, namely (i) holistic planned grazing (HPG) and (ii) animal impaction of crop fields. However, the effects of HM on the livelihoods of its beneficiaries currently are poorly understood. In order to address this lacuna, this study aimed to determine both the intended and unintended effects of a community-based land restoration programme called Holistic Land and Livestock Management (HLLM) in the HCLs of Zimbabwe on the livelihoods of its beneficiaries through a conceptual framework that combined an actor-oriented livelihoods approach with concepts of everyday politics and resistance. This was done by exploring the impact of HLLM on the six types of farmers' assets, adoption patterns, farmers' reactions to the introduction of HLLM, and challenges preventing farmers from adopting HLLM. Case studies employing a qualitative and exploratory research design were undertaken in three communities that were selected purposively from a total of 18 communities in which the HLLM programme had been promoted by the Africa Centre for Holistic Management (ACHM) in order to discover different perspectives on the effects of the programme on the livelihoods of its beneficiaries. The study employed qualitative Participatory Rural Appraisal tools, focus group discussions, participant observation, document analysis, and key informant and semi-structured interviews. The study showed that adoption levels were disappointingly low across all the study sites. Several challenges, including livestock diseases, predation, cultural stigma, labour constraints and witchcraft fears, were among the barriers explaining the low rate of adoption in the HCLs. The findings reveal that the farmers were concerned more with immediate problems, especially lack of water, than with land degradation, which is the primary focus of HLLM. Thus the farmers responded by complying, accommodating and covertly resisting the ACHM's efforts to implement HLLM in order to suit their needs, using creative everyday politics and resistance. The study concludes that, although HLLM is required in such semi-arid environments, it is not sufficient to sustain rural livelihoods in its current state. While the main focus of HLLM is to improve the natural capital (i.e. restoring degraded watersheds), it should be complemented by and aligned with the farmers' other development priorities, especially those relating to water.

Keywords: actor-oriented livelihoods perspective, Africa Centre for Holistic Management (ACHM), everyday politics and resistance, holistic management, Holistic Land and Livestock Management (HLLM), Zimbabwe

Promoting the use home-mixed supplements as alternatives to commercial supplements in smallholder beef production systems of the sub-humid region of Zimbabwe

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Two trials were conducted in Goromonzi and Murehwa districts during 2013 and 2014 with the objective of demonstrating the economic viability of using alternative feed supplements in smallholder beef-fattening enterprises. In Experiment 1 (2013), 12 beef cattle were divided into four treatment groups, randomly assigned to four dietary treatments: mucuna hay-based supplement (MHS), lablab-cowpea hay-based supplement (LCH), commercial beef concentrate (CC) and farmer practice (CO). Each treatment was assigned three cattle which were fed individually. In experiment 2 (2014), 39 beef cattle were randomly assigned to five dietary treatments: mucuna hay-seed-based supplement (MHS), lablab hay-based (LH) supplement, groundnut stover-based supplement (GS), poultry litter-based supplement (PL) and a commercial beef concentrate (CC). Diets were formulated to be iso-nitrogenous (14% CP) and iso-calorific (12 MJME.kg^{-1}) and were offered at 1.5% of body weight (BW) daily for 60 days. Maize stover was offered *ad libitum* to pen-fed cattle in both experiments. Cattle in the CO treatment (farmer practice) were left to graze the veld with occasional supplements as normal practice. Body weight was measured weekly and fortnightly in Experiment 1 and 2 respectively. Supplementary feed and water intake was measured daily. In Experiment 1, BW was significantly ($p<.05$) high for animals on MHS (60.33 kg) and least for animals on CO treatment (16.10 kg). In Experiment 2, animals fed GS had significantly higher weight gain (42.7 kg) and those on PL (28.0 kg) were least. In both experiments, males had a significantly ($p<.001$) higher BW gain than females on the same diet. Generally, feed costs were highest on commercial ($0.26 kg^{-1} in Experiment 1 and $0.37 in Experiment 2). Poultry litter based supplement cost the least ($0.19 kg^{-1}). Cattle on MHS achieved the highest gross margin ($460.42 and $121.87, in Experiments 1 and 2, respectively). Experiment 2 showed that GS is superior to LH in terms of BW gain and economic return. The results indicate that MHS and GS supplementary diets are the most viable in smallholder beef fattening enterprises.

Keywords: substitute, beef cattle, forage, gross margin

The potential of replacing conventional dairy supplements with forage legume-based diets in Zimbabwe's smallholder dairy sector

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The viability of supplementing crossbred dairy cows with forage legume based-diets in crop-livestock integrated smallholder farming systems was investigated over two consecutive dry seasons. The objective of the study was to determine the effect of replacing commercial supplementary feeds with iso-energetic (12 ME MJ.kg^{-1} ME) and iso-nitrogenous (16% crude protein) *Mucuna pruriens (var. Utilis)*-based supplements (MPBS), *Vigna unguiculata (var. CBC3)*-based supplements (VUBS*)* and *Lablab purpureus (var. Highworth)*-based supplements (LBPS*)* on milk yield, milk quality and economic returns. In a two-step process, using 3 x 3 Latin square designs, nine multiparous Red Dane, Guernsey and Holstein-Friesian crosses that were in mid-lactation (130±19 days), were offered legume-based supplementary feeds for 63 days at 0.5 kg.l^{-1} of milk produced. MPBS and VUBS were compared against a commercial supplement (NF Pastulac 16% Dairy meal) in the 2013 dry season. In the subsequent 2014 dry season, MPBS and LPBS were compared against the same commercial supplement. The cows were hand-milked twice daily and level of supplementation was adjusted weekly based on milk yield of the previous week. Daily milk yield was significantly different among all supplements ($p<.05$) in both seasons. Cows on commercial supplement had consistently higher milk yield (6.7 kg.cow^{-1}.day^{-1} in 2013 dry season and 6.8 kg.cow^{-1}.day^{-1} in 2014 dry season) than cows on LBPS (6.4 kg.cow^{-1}.day^{-1} in 2014 dry season) and MPBS (6.1 kg.cow^{-1}.day^{-1} in 2013 dry season and 6.0 kg.cow^{-1}.day^{-1} in 2014 dry season) while cows on VUBS had the least milk yield (5.7 kg.cow^{-1}.day^{-1} in 2013 dry season). Milk fat content was also significantly ($p<.05$) higher in cows fed commercial supplements (2.65% in 2013 dry season and 2.72% in 2014 dry season) in both seasons, but was however significantly ($p<.05$) lower than fat content in milk from cows fed LPBS (2.97%). Milk protein content of cows on commercial supplements was significantly ($p<.05$) higher than those on forage-based supplements in both seasons, but was similar to cows fed LPBS in the 2014 dry season. Total solids and lactose contents were significantly ($p<.05$) higher on both commercial and LPBS than in milk from cows fed MPBS and VUBS. Dietary return kg^{-1} of supplement was of the order MPBS >LPBS>commercial>VUBS. The results indicate that lablab-based supplements (LPBS) can complement or even substitute commercial supplements in smallholder dairy feeding systems.

Keywords: smallholder dairy, milk production, forage legumes, Zimbabwe

Improving market participation and competitiveness of communal area beef farmers in Zimbabwe's Mashonaland East Province through better feeding and value chain initiatives.

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A three-year collaborative Research for Development project (ZimCLIFS) funded by the Australian Centre for International Agricultural Research (ACIAR) in Zimbabwe and managed by ILRI (International Livestock Research Institute) is improving market participation and competitiveness of communal area beef farmers in two districts of the Mashonaland East Province through initiatives on beef value chains that are conceived at Ward-level Innovation Platforms (IPs). The project commenced in 2012 and serves farmers who own 3.47 ha (s.d. 2.79) of inherently infertile granitic sandy soils that are of low pH (3.8 – 5.5 $CaCl_2$). Baseline studies indicated that most farmers were investing in field crop production during the wet season and stream-bank horticulture during the dry season. Only 52.5% of the farmers owned cattle. Average herd size was 5.22 (s.d. 3.89), consisting mainly of indigenous types. Through several activities that included on-farm livestock feeding experiments on use of improved varieties of pulse and forage legumes as hay and farmer training on live-beef-cattle grading and pricing, cattle fattening gained popularity. Among four dietary treatments that were tested, mean growth rates of 0.74 and 0.73 $kg.day^{-1}$ and superior carcass grades were achieved with cattle on home-mixed (14% CP) rations of *Mucuna pruriens*:maize:soya meal:vitamin (40:14:45:1) or groundnut tops:maize:soya meal:vitamin (43:40:16:1). The supplements were fed at a rate of 4 $kg.day^{-1}$, with *ad libitum* maize stover as basal forage during the dry season. The rations significantly ($p<.05$) out-performed a standard commercial supplement which achieved 0.64 $kg.day^{-1}$ at the same feeding level. In addition, *Mucuna* and groundnut–based supplements were cheaper than the commercial supplement, each costing \$0.27, \$0.31 and \$0.37.kg^{-1}, respectively. Competitiveness was also achieved through training of IP stakeholders to work collectively in input/output market research and lobbying to obtain economies of scales when reaching out to nearby abattoirs. The area under improved pasture in the project area increased by over 121% from 14.6 ha (67 farmers) in 2012/13 to 32.28 ha (215 farmers) in the 2014/15 wet season. The number of farmers involved in pen-feeding increased from 1 in 2013 to 18 in 2014 and will continue to increase since practising farmers have demonstrated that they now have better incomes and livelihoods. In 2014, forage markets began to develop as several crop farmers sold legume hay to their livestock-rearing neighbours. There are efforts to out-scale this work to other districts. Outputs from this project will be used to identify key research areas and develop impact pathways for the future.

Keywords: Conservation agriculture, beef, pen-fattening, innovation platform

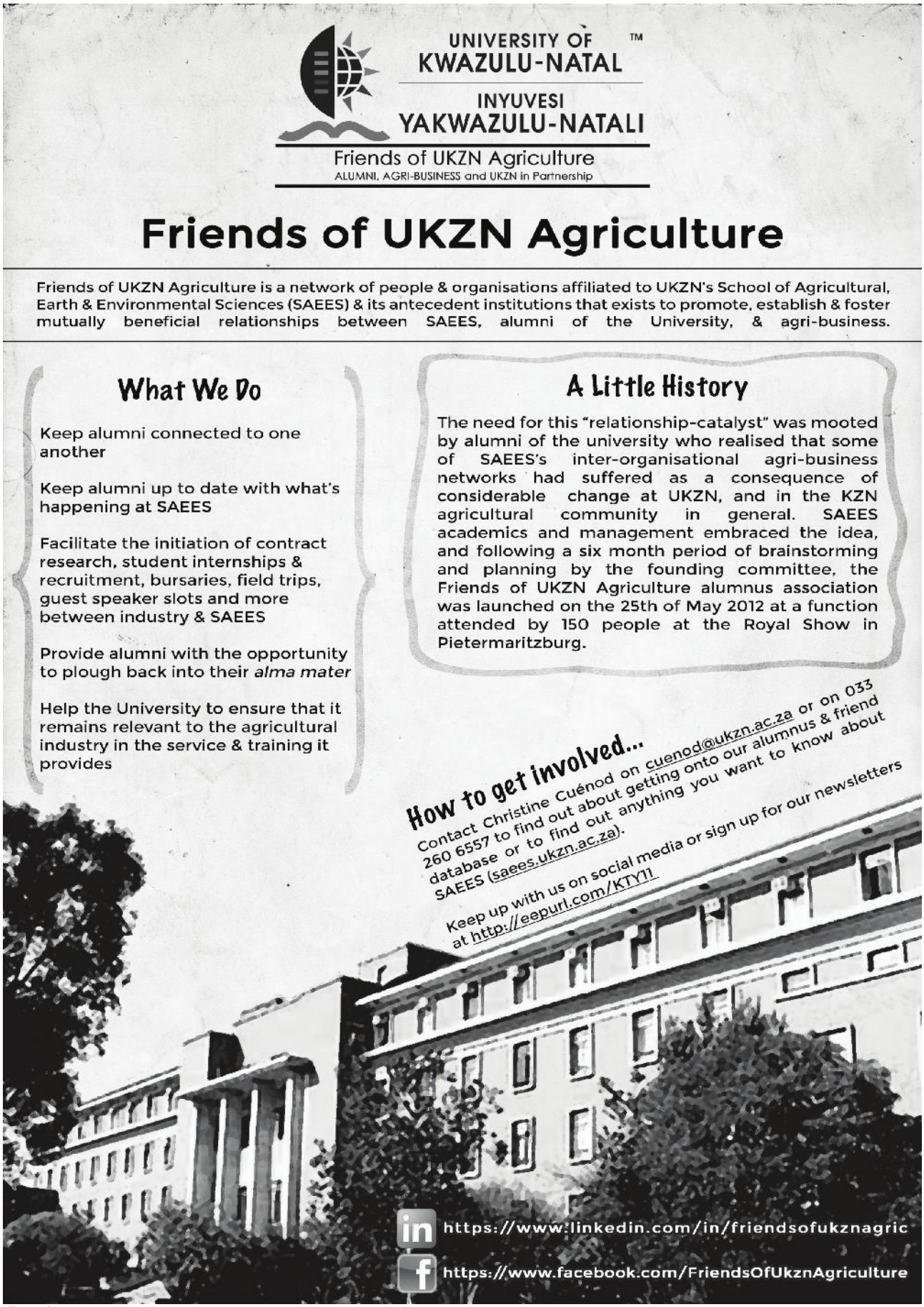

Illustration 4: FoUKZN