Forage-based beef cattle production in red soils region of southern China

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Materials and methods Materials: (Pennisetum *purpureum* × *P.americanum*) × *P.purpureum* cv. Mott, Dwarf elephant grass, Solander setaria, Chicory, Wynncassia, Lotononis, rye grass, king grass, rice straw, rice bran, cottonseed meal, ammonia bicarbonate, urea, ammoniated water and beef cattle hybrid. Methods: plot trials, feeding experiments, chemical analysis.

Results 1) Impact of seasonal change on yield and quality of the tested pasture species Among the tested species, (*Pennisetum purpureum* × *P.americanum*) × *P.purpureum* cv. Mott produced the highest leaf yield (14,500 kgDM/ha) and total yield (20,000 kgDM/ha), followed by Dwarf elephant grass and solander setaria. (*Pennisetum purpureum* × *P.americanum*) × *P.purpureum* cv. Mott., Dwarf elephant grass, Solander setaria, Chicory, Wynncassia and Lotononis can grow from March to November, providing available feeds for a period of 6 months from May to October. The protein content ranged from 12.4-19.0% for (*Pennisetum purpureum* × *P.americanum*) × P.purpureum cv. Mott., Dwarf elephant grass, Solander setaria and Chicory, and from 13.9-19.7% for Lotononis and wynncassia. The curve of protein content of all the tested pastures in growth season shaped as "V" type (Win et al, 2007).

2) Preparation of fresh forage and roughage The effects of ammonia sources, N inclusion, ammoniation duration and chop length on the quality of ammoniated rice straw were studied. Results showed that ammoniated water was the best material to treat rice straw. The nutritive value of ammoniated rice straw increased as the amount of ammonated water increased and the duration prolonged (He et al, 2005). An experiment was conducted to compare the nutritive values between corn silage and king grass silage, with corn silage having the better nutritive values (Xie et al, 2004).

3) Study on the techniques of beef cattle year round feeding Beef cattle hybrids fed on ammoniated rice straw supplemented with 7g corn and 3g cottonseed meal (kg LW/d) had the highest ADG (1.44kg) when compared to rice straw, microbial fermented rice straw, corn silage with or without supplements (corn, rice bran, cottonseed meal, urea ect.) treatments (He et al, 2004; Xie et al, 2005).

Beef cattle hybrids fed on Dwarf elephant grass supplemented with 5g rice bran and 5g cottonseed meal (kgLW/d) had the highest ADG (0.8kg) when compared to King grass, Paspalum atratum and Kudzu treatments with or without supplements (rice bran, cottonseed meal, urea ect.) (Xie et al, 2004; Xie et al, 2006; He et al, 2006).

4) Study on the cycling and utilization of nutrients in ecosystem of forage-cattle-biogas There were no significant differences between the effects of different fertilizers (chemical fertilizer only and chemical fertilizer plus biogas fertilizer) on the yield and nutrient accumulation of rye grass or corn. Inclusion of biogas fertilizer could save synthetic chemical fertilizer by 1/3 and also improve the soil fertility (Liu et al, 2003).

Conclusions (*Pennisetum purpureum* × *P.americanum*) × *P.purpureum* cv. Mott., Dwarf elephant grass, Wynncassia, Lotononis and Kudzu could be recommended to establish in southern China for forage-based beef cattle production; the optimal feeding method for the beef cattle production would be: ammoniated rice straw (treated with ammoniated water (20% NH_3) at an inclusion of 20% or at 5% if with urea, with the addition of rice bran (5g/kgLW/d) and cottonseed meal (1.5g/kgLW/d) in winter; ammoniated rice straw plus rye grass (12gDM/kg LW/d) and rice bran (5g/kg LW/d) in spring; Dwarf elephant grass plus Kudzu vine (5g/kg LW/d), rice bran (5g/kg LW/d) and cottonseed meal (3g/kg LW/d) in summer and autumn.