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Developing winter forages for the far north Queensland dairy industry

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The far north Queensland (FNQ) dairy industry has historically relied on the use of maize silage in dairy diets either year-round in partial mixed ration systems, or as a supplement in pasture-based systems during dry times. Maize grows very well during summer in the north Queensland environment and has therefore been readily available to farmers at reasonable cost. However, there are several challenges which can significantly impact the quality of the end product. Harvesting the crop at the correct dry matter percentage, lack of contractors and machinery to harvest large areas that mature at the same time, and more recently the impact that fall army worm has had on yields and cost of production. Inclusion of protein in adequate amounts in FNQ dairy diets is also a challenge due to the cost of freight required to transport typically used protein meals such as canola and soybean. Is there an opportunity to grow winter forages in far north Queensland which are higher in protein than maize silage which can offset the high cost of protein meals in cow diets? These crops can be harvested at a time of year when competition for silage contractors and machinery does not exist therefore increasing the likelihood of harvest occurring at optimum crop dry matter.

In 2021, a demonstration site was established on a dairy farm at Malanda. A ten-hectare irrigated site previously planted to summer maize was planted to four winter forage crops in July. Canola variety (var) Hyola, Wheat var. Buchanan, Wheat var. Bennett and Barley var. Shepherd were planted into 1.5 hectares (ha), 2 ha, 2 ha and 4 ha blocks respectively. Crops were monitored regularly for incidence of pest and disease and nutrient deficiencies. Forage samples were taken at different growth stages and analysed for crude protein (% DM), neutral detergent fibre (% DM), starch (% DM) and metabolisable energy (MJ/kg DM) at Forage Lab Australia using NIRS analysis. Yield data (kg DM/ha) was collected intermittently throughout the duration of the demonstration. Table one shows results from forage samples taken at 54 and 82 days post planting. The yield and quality of the Shepherd barley crop was compromised as a result of the fungal pathogen Bipolaris sorokiniana (*Cochliobolus sativus*), common name Spot Blotch. This affected the crop from day 53 onwards. All crops were harvested and ensiled on day 94 of the demonstration.

Table 1. Yield and concentrations (DM basis) of crude protein, neutral detergent fibre (NDF), starch and metabolisable energy 54 and 82 days after planting for four winter forages grown in far north Queensland

Crop	Yield (kg DM/ha)	Crude Protein (% DM)	NDF (% DM)	Starch (%DM)	Metabolisable energy (MJ/kg DM)
Canola var. Hyola*	2745	30.6	25.9	4.6	11.6
Wheat var. Buchanan*	4109	21.1	48.3	1.9	10.6
Wheat var. Bennett*	2997	27.8	41.8	2.3	11.1
Barley var. Shepherd*	3919	17.4	53.7	1.7	10.0
Canola var. Hyola**	4084	13.9	41.6	3.2	9.7
Wheat var. Buchanan**	7865	12.9	48.7	5.7	10.5
Wheat var. Bennett**	4870	15.3	47.8	2.2	10.6
Barley var. Shepherd**	7738	9.6	53.0	4.4	10.3

*Samples taken on day 54. **Samples taken on day 82.

The yield and quality results from this demonstration show that there is potential to grow winter forages in FNQ that are high in quality, versatile and have comparable yields to winter crops grown in other parts of Queensland. Both Hyola canola and Bennett wheat have demonstrated the ability to produce forage with high crude protein (% DM) in a relatively short time (54 days), and both crops demonstrate good regrowth ability which indicates that harvesting the crop multiple times is possible and could provide two silage cuts and a final hay or graze option. The challenge for farmers harvesting at 54 days will be the need to wilt the crop prior to ensiling at a time when drizzly wet weather can occur. Buchanan wheat has been selected for suitability to FNQ conditions and although lower in crude protein (% DM), it yielded very well (11147 kg DM/ha at harvest-day 94) and had no disease issues. Given the susceptibility of Shepherd barley to spot blotch, and the difficulties and expense this presents to the farmer, this variety is not recommended for production in far north Queensland.

Further work is required to determine agronomic best practices and optimum harvest times for these crops in both irrigated and dryland systems. An economic analysis of the cost per kilogram of crude protein produced from Bennett wheat and Hyola canola is required. This result should be compared to the cost per kilogram of crude protein provided by bought in protein meals. The opportunity to grow a crop which can be harvested in September or October (outside of the peak harvesting time for maize silage) could be attractive to dairy farmers in FNQ.

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