Cows have a sweet tooth

by Ajantha Horadogoda and Yani Garcia

FutureDairy research has shown that dairy cows prefer forages that are sweet.

Dairy cows' preferences for a range of grasses, legumes and herbs were investigated through a series of trials, each conducted over two years at the University of Sydney's Camden research farm.

The 'sweeter' forages contained higher levels of water soluble carbohydrates, while the less palatable forages were higher in nitrate which is associated with a bitter flavour.

All species were grown at the same site, under the same climatic conditions and with soil moisture and nutrient availability being non-limiting to plant growth.

Preferred grasses

The first trial included eight grasses, four legumes and two herbs which were grazed year round for two years.

The most preferred species over the whole year was prairie grass, followed by kikuyu, and then white clover, despite the fact that the kikuyu was not available during the winter (see graph). Fescue was the least preferred grass.

Cows' preferences varied with the time of the year, in line with changes in the growth pattern of different species. For example, Kikuyu and phalaris were preferred in summer while prairie grass was preferred above all other species during the winter months.

Unexpectedly, perennial ryegrass had a moderate preference even when it was in its vegetative growth state, from autumn to spring.

Summer legumes

A separate trial compared cows' preferences for three summer legumes: soybeans, cowpeas and lablab.

The preferred summer legume was soybean cv Intrepid which had a 65% preference over cowpeas and lablab.

The chemical analysis of the three legumes was quite similar, suggesting that factors other than nutritive characteristics may influence cow preferences.

Percent of time spent by cows on each forage species.
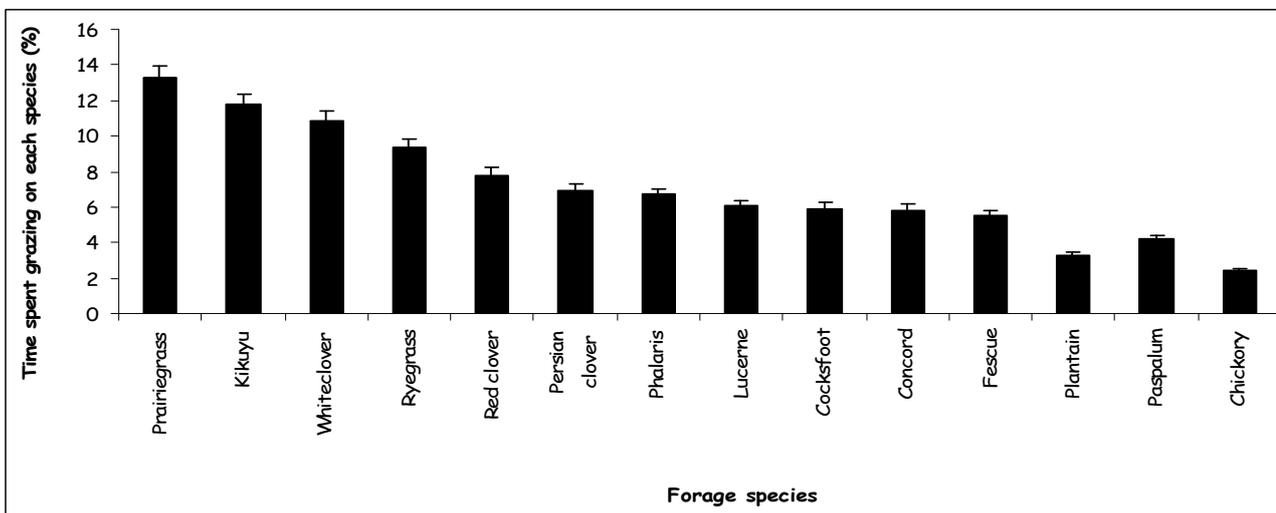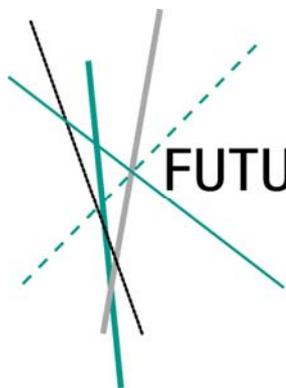
Plant stature

Plant stature may be involved in cow's preferences for different forage crops.

The erect growing nature of the soybean makes it more readily consumed than laterally growing lablab.

In a trial of different varieties of field peas, cows preferred the semi-leafless variety 'Sturt' which has fewer tendrils than the leafless varieties Morgan and Kaspar. The tendrils on the leafless varieties tend to create a 'mesh' between the plants, making it difficult for cows to graze

Brassicas

Another trial compared different brassicas (forage rape, turnip and radish) with ryegrass and white clover.

Although this trial has just been completed, early results suggest that ryegrass/white clover is the favourite, followed by forage rape, leafy turnip and lastly fodder radish.

The erect stem of forage rape may have a role in palatability, and the radish was higher in nitrate. More will be understood after the trial is finished and the full set of results analysed.

Automatic milking

The findings will be particularly important for farms with robotic or automatic milking systems (AMS).

The success of an automatic system relies on cows moving voluntarily from the paddock to the dairy and back again. Feed is the main incentive used to encourage cow movement around the farm, so offering forages that are highly palatable may be an effective management tool for AMS farms.

For more information

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About FutureDairy

FutureDairy aims to help Australia's dairy farmers manage the challenges they are likely to face during the next 20 years. The challenges are expected to be related to the availability and cost of land, water and labour; and the associated lifestyle issues.

Our activities are structured around two priority areas – Precision farming (including automatic milking and innovations) and Feedbase (forages and feeding). These are the areas where there are opportunities to address the challenges related to water, land and labour resources.

For **Precision Farming** we are investigating technologies with potential to improve farm productivity, efficiency, labour management or lifestyle. FutureDairy is pioneering the development of pasture-based farming systems that use robotic milking for larger herds. Our research is conducted at Australia's first automatic milking system (AMS) research farm, at Elizabeth Macarthur Agricultural Institute at Camden. Since mid-2009 we have been testing a new concept automatic milking system designed specifically for Australian conditions, while continuing to further develop the farming system around the milk harvesting equipment.

Our **Feedbase** goal is to develop sustainable dairying systems for the future, with the intensification of home-grown feed to enable more efficient use of land, water and grain. Our trials are being conducted at the University of Sydney's Corstorphine dairy farm and Mayfarm. The investigation is complemented with modelling and component field research in areas of forage production and utilisation.

We are investigating a complementary forage system (CFS) that involves triple cropping on 35% of the farm area and growing pasture on the remaining 65%. Our target is to produce more than 25t DM/ha/y rover the whole farm area, in a sustainable way. The three crops include:

- a bulk crop (eg maize);
- a legume for nitrogen fixation (eg clover); and
- a forage to provide a pest/disease break and to improve soil aeration (eg a brassica).

FutureDairy is now in its second phase. During the first phase, we used existing technology for automatic milking to test the feasibility of robotic milking in a pasture based system. The promising results paved the way for testing a new prototype AAMS with a larger herd during phase 2.

In the first phase, our Feedbase studies tested the feasibility of a complementary forage rotation grown on a small area, both under research and commercial conditions. Phase 1 combined technical research with social research and extension research. During phase 2 we are drawing upon that learning experience to improve our linkages with major extension groups.

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