BROWSE SILAGE IN THE UAE

Jaap Wensvoort

Private Office of Sheikh Hamdan Bin Rashid Al Maktoum, Dubai United Arab Emirates.
E-mail: jwensvoort@hotmail.com

Introduction

The diets of free ranging herbivorous animals in the United Arab Emirates (UAE) have originally included some form of browse (buds, flowers, leaves, twigs and bark) in various quantities. However, the feeds currently supplied to captive herbivores in the UAE are commonly restricted to grasses, alfalfa, vegetables, grains, grain by-products, mineral and vitamin supplements and compounded feeds. Fresh browse is sometimes supplied, but usually in limited amounts due to lack of availability.

Feeding Instead of Browsing

The ability to browse effectively and efficiently is a learned behaviour in free ranging animals (Distel et al 1991; Moore, 2003; Marsh et al, 2007). In many cases browse choice is governed by digestive, metabolic and physical adaptations (Hofmann 2000). However, in a captive situation these choices are often removed and the nutrition of browse, if offered, is based on availability, perceived palatability and historic animal preference. There are numerous species of browse plants but unfortunately the feed value of browse is only marginally understood (van Soest, 1996). Historically, many collection managers and keepers were reluctant to feed browse due to perceived toxicity through plant secondary metabolites (PSM) (Rietschel 2005). However in spite of these difficulties, the use of browse in zoos is widespread (Plowman et al. 2006). Although the consumption of PSM's can cause food aversion (Provenza 1995), pathological and sometimes lethal effects (Atanasiadou 2005) they can also be eaten without manifesting any problems (Moore 2003). It has been shown that PSM's can exert beneficial effects on animal health (Mefodev 1996; Niezen et al 1998; Molan et al 2002; Hoste et al 2005) as well as increasing dietary efficiency (Leng 1997; Shelton 1999; Kamel et al 2008). It is therefore important that keepers who feed browse to their charges understand the implications of the browse type, amount of browse as well as the combinations or sequence in which the browse should be fed. Moore (2003) reported that certain animals are better at selecting and digesting browse than others. Captive specialist or generalist browsers fed a limited supply or no browse, often under-perform, suffer from disease and can die. (Palgi 2005; Miller et al 2008; Claus et al 2008). Other examples include peracute mortality syndrome in giraffe (*Giraffa camelopardalis*); wasting syndrome complex in moose (*Alces alces*); soft faecal consistency in tapir (*Tapirus spp.*) and langurs (*Trachypithecus auratus auratus*).

Fig 1. Drum being filled in the browse press.

Availability of Browse

Existing plantations such as fruit farms, cultivations along road sides and in parks and gardens produce green waste from which browse could be selected for animal feeding. However, harvestable plantations are usually far from animal enclosures and fresh browse is, mainly due to its morphology, difficult to transport and store efficiently.

A plantation dedicated to fresh browse supply and planted close to animal enclosures might solve the problem of browse availability. However, in doing this, the supply and quality of water needs to be ensured and carefully planned. By concentrating on salt tolerant, but nutritious plant species, some of these limitations might be overcome, making the plantation much more sustainable. A potential challenge to the management of a browse plantation could be the effect of regular pruning on the nutritional quality of browse and its potential re-growth; issues which are not well understood.

Some examples of browse plants species in the UAE include:
Sidr (*Zizyphus spina-cristi*), damas (*Conocarpus lancifolius*), saltbush (*Atriplex* spp), ghaf (*Prosopis cinerea*), ghaf al bahr (*Pithecellobium dulce*), leucaena (*Leucaena leucocephalia*), rakh (*Salvadoria persica* and date palm (*Phoenix dactylifera*)

Fig 2. Goats eating browse silage.

Browse Investigation

Within the UAE there is an increasing demand for browse as a feed source for domestic and exotic animals. The potential supply of high quality browse from the existing plantations normally found along roads, public parks, farms and private gardens within the UAE has been recognised. If handled properly and ensiled in plastic drums, good quality browse should be available all year round. Additionally, the availability of animal feed from local plant material, primarily grown for landscaping or fruit production contributes to a better utilization of water resources as well as reducing the need for animal feed imports and cultivations.

The author has initiated a project in Dubai to investigate the suitability of browse for ensiling and animal feed as well as investigating solutions to the limitations of availability, transportation and storage of browse. In this project, browse, which is considered suitable as animal feed, is collected and preserved by ensiling it in plastic drums at the site of the browse plantation. To facilitate ensiling, an experimental hydraulic press has been developed. The hydraulic press can handle drums with a volume of either, 30, 120 or 200 litres and exerts a maximum pressure

of 130 bar. To date, 54 (120 litre) drums have been filled with between 55 - 65 kg of browse. They were stored in the shade for approximately three months. Some were opened after three months and the browse silage was fed to two herds of goats. Although it is too early to give detailed results, preliminary observations of the goats has shown that they readily consume the silage.

The next phase of the project has seen the hydraulic press been made mobile as well as adding the ability to extract the air from the closed drum and replace it with nitrogen gas through a gas injection system.

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Fig 3. Mobile browse press.

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