

# Grazing cereal grain crops – a discussion paper for Grain and Graze

The national feedbase project team

April 2007

Cereal grain crops are grazed in many farming systems, and many of the Grain and Graze regional projects are examining grazing cereals. This paper is designed to stimulate discussion and raise a number of farming systems issues that we believe should be borne in mind when thinking about grazing cereal grain crops.

## **Ways to graze cereals**

The most common modes of utilising cereal grain crops are either to graze the stubbles or to graze during the vegetative phase, with little effect on grain yield. There are, however, at least six ways in which cereal crops can be utilised by livestock:

1. **Grazing dual-purpose crops** during the late vegetative and early reproductive phases with the intention of preserving most – if not all – of the grain yield. These systems are the focus of most attention in the Grain and Graze program.
2. **Sacrificial grazing** during mid-late reproductive phases, where there is little prospect of a commercial grain harvest, such as in a drought.
3. **Conserving crop biomass** prior to harvest, where crops may be cut either for hay (usually early in reproductive growth) or for whole-crop silage (later in reproductive growth). This option can be attractive at times when there is a scarcity of fodder in other regions.
4. **Grazing standing crops** after maturity, where livestock utilise both the grain and the stover. This is often done to carry other fodder over into the summer period when it may be in short supply.
5. **Grazing dry crop stubbles** after harvest, traditionally done in many cropping systems
6. **Grazing stubble regrowth** after harvest. This often occurs with weak perennials such as grain sorghum; if the crop is not killed at harvest re-sprouting of shoots can occur, producing new vegetative biomass that is able to be grazed.

The role for each mode of use within a farming system will depend on a host of factors: crop to livestock balance, climate, timing and magnitude of feed gaps. Some of these grazing options (e.g. dual-purpose and stubble grazing) can be combined.

When thinking about grazing cereals in the farming system it is important to consider **the marginal value of such feed**. In warmer, winter-dominant rainfall regions, dual-purpose grazing of winter cereals will provide feed at a time of the year when feed may be in plentiful supply elsewhere on the farm from pastures and fodder crops. On the other hand, sacrificial grazing later in crop growth in a drought year may provide highly valued feed.

## **Livestock production from cereal forage**

The nutritional value of cereal biomass for livestock will influence production expectations.

- During winter and early spring when dual-purpose grazing is practised, the quality of cereal forage is extremely high (DM digestibility 80-90%, crude protein 21-26%). The timing of grazing will generally be determined by the tradeoff between maximizing herbage mass and avoiding grain yield losses. Wheat forage at this time is commonly deficient in sodium and may also be deficient in magnesium; supplementation with these elements is a cheap and effective insurance policy.
- There are few Australian data for the quality of cereal forage during reproductive growth, at the times when sacrificial grazing and conservation will be carried out. Overseas data for wheat show

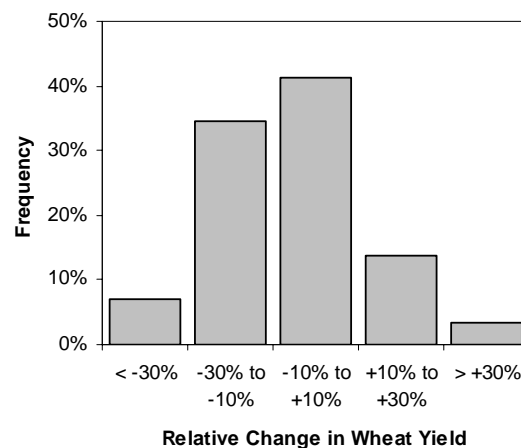
a marked drop in forage digestibility from about 80% part-way through stem elongation to about 60% at anthesis, with a levelling-off from anthesis until grain ripening.

- Post-harvest, the quality of cereal stover will be low (average digestibility in modern cultivars can be expected to be below 40%). Livestock placed on stubbles will be extremely selective, concentrating their grazing effort on spilt grain, on any germinating “green pick” and on the relatively small proportion of leaf in the stubble. A short period of weight maintenance (about 4 weeks) is generally followed by significant weight losses once these higher-quality components of the stubble are exhausted.

### **Impacts on grain yield**

The impact on grain yield of dual-purpose grazing will be influenced by the interaction between grazing timing, intensity and duration and by seasonal conditions.

- Provided grazing does not extend beyond the point where animals eat too many of the elongating floral meristems, the crop can regrow and produce grain. Cereal crops can compensate for the removal of some meristems by means of increased tillering.
- Grazing will reduce the leaf area index of the crop, which in turn will slow its growth during the post-grazing period. All else being equal, this will reduce grain yield.
- However, the reduced leaf area after grazing also means that the soil accumulates more water until the crop canopy recovers. This water will then be used later in the growing season (e.g. during grain filling), when the water-use efficiency for grain production is higher. As a result, an early-season grazing can increase yield in years with a dry spring.



Frequency distribution of changes in yield due to dual-purpose grazing in wheat crops grown in SE New South Wales and the ACT. 29 crops from 13 experiments are included, covering a range of different grazing treatments.

- Grazing will also delay the development of grain crops, which can allow them to respond to late rain it falls.

In systems where stubble regrowth is allowed to occur, the extra water used by the new growth may be to the cost of the following crops, if it is dependent on stored soil water.

### **Management demands: infrastructure, time & complexity**

The management demands of grazing cereal crops are another consideration.

- Depending on the crop-pasture balance on a property, there may be insufficient livestock to graze the area of cereal crop, especially for stubble or sacrifice grazing. Restrictions on livestock movement between properties (e.g. for Ovine Johnes Disease control) exacerbate this problem. Conservation may be a viable alternative tactic to sacrifice grazing.
- High stocking densities are preferable when dual-purpose grazing. When livestock numbers are limiting (e.g. on properties with high crop area:pasture area ratios), temporary fencing and frequent shifts of livestock will be required to achieve a density of animals that will maximise utilisation of crop biomass and minimise trampling damage.
- In dual-purpose systems it will be necessary to monitor crop development stage and feed on offer to ensure that grazing does not impinge on reproductive development.

For some farmers, such expectations for a higher level of grazing management may be incompatible with their experience, resources or preferences.

### ***Other costs and benefits***

While most economic analyses of grazing cereals consider the livestock production and grain yield, there may be a number of other costs and benefits that need to be considered.

- On the benefits side, in paddocks with high weed burdens, sacrificial grazing may provide an ideal opportunity to **control weeds** late in growth without having to switch to a pasture phase.
- In dual purpose systems, reduction in vegetative material through an early season grazing may **reduce stubble burdens** following harvest. High stubble burdens can hamper following crop establishment, and can be difficult to reduce after harvest if livestock numbers are limited or there are restrictions to traditional methods of disposal (tillage, burning).
- Conversely, in lower yielding areas a reduction in stubble biomass may have consequences for stubble carryover, ground cover and hence **erosion risk**.
- On the costs side, **soil compaction** is often cited as a negative, particularly for cattle and on clay soils in wet conditions. In tramline farming systems, livestock could be seen as incompatible with cropping practices.