The Influence of Crop Maturity and Type of Baler on Whole Crop Barley Silage Production

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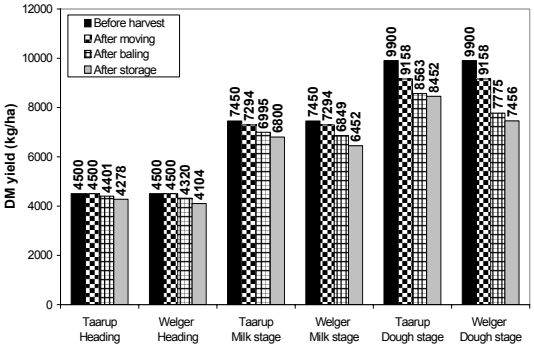
Introduction Bale ensiling is based on long cut forages. Earlier studies (Honig, 1984; 1987) have shown the importance of laceration and high density in preventing fungi growth and storage instability. On the other hand use of an efficient baling technology reduces the time between moving and wrapping of bale to less than 10 minutes with a combi-baler compared to two hours with a separate wrapper. Even during feeding late fermentation is restricted as the bale is fed within some hours after opening. Ensiling of whole crop cereals needs the addition of silage additives to avoid clostridial fermentation (Weissbach *et al*., 1988). Late silage additive studies have shown the impact of using sodium benzoate in combination with sodium nitrite to baled crops (Knicky & Lingvall, 2002).

Materials and methods The spring variety of barley was harvested by a mover/conditioner Taarup 3028 at three stages of maturity; heading, milk stage and dough stage. The relation between ears and straw as % of forage dry matter (DM) were: at heading 23/77, at milk stage 37/63 and at dough stage 55/45. Two types of baler were used: Taarup BaleInOne (14 knives - 70 mm cut length and Welger 220 Profy (23 knives – 45 mm cut length). The forage was treated with Kofasil Ultra at the rate of 4 l/t during baling and were wrapped with 12 layers of white stretch film. Losses during moving, baling, conservation and storage were registered. Ensiled forage was used in feeding experiments with heifers.

Results The data in Figure 1 demonstrates a significant influence (P<0.001) of DM yield with increasing forage maturity. The losses during moving/conditioning of the crops increased (P<0.001) from nil at heading to 21 g/kg DM at milk stage and 75 g/kg DM at dough stage. Losses during baling also showed an increasing trend as forage matured (P<0.001), on average 30 g/kg DM at heading, 50 g at milk stage and 110 g at dough stage. A considerably higher loss (P<0.001) during baling was obtained from Welger 220 Profy at all stages of maturity in comparison with Taarup BaleInOne (P<0.001). The main loss consisted of ears. During conservation and storage, the losses were 28 g/kg DM both from silage produced at heading and milk stage but only 13 g/kg DM from dough stage (P<0.03). Preliminary results from the feeding trial with heifers (average live weight kg, 300 at start and 370 at the end) showed a daily gain of 0.8 kg/d, an average intake of 2.07 kg DM and 1.10 kg NDF per 100 kg live weigh independent on stage of maturity.



Conclusions Ensiling of whole-crop barley at dough stage resulted in the highest forage production per ha. The mover/conditioner gave high losses of ears at the dough stage. The Taarup baler with restricted number of knives gave lower losses than the Welger baler. The same indication was found comparing ensiling in bales and precision chopped forage in silos. In a "gas tight" bale laceration seems to increase fermentation and losses. No hygienic quality problems were found among the 300 bales produced.

Figure 1 Yield of whole-crop barley forage in relation to the stage of maturity and type of baler

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