



FORAGE QUALITY OF BARLEY HAY

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INTRODUCTION

Barley (*Hordeum vulgare* L.) grown for hay increased to more than 20,000 ha in North Dakota by 2004. Most of the increasing hectareage has been with the forage-type barleys, but some continues to be the grain and feed-type barleys. A few cultivars have been evaluated for yield potential at Dickinson, Williston, and Carrington, ND. Carr (2004) at Dickinson, ND, reported significant difference among barley cultivars tested for forage yield, total digestible nutrients, and crude protein, but he did not report maturity at harvest. 'Hays' barley had a slightly greater relative feed value than 'Haybet' at Williston, ND, but no difference in forage yield (Williston Res./Ext. Center, 2005). 'Westford', Hays, and 'Bestford' were the highest yielding entries at Carrington, ND, when harvested at soft dough, but forage quality was not determined (Zwinger, 2005).

OBJECTIVE

1. To evaluate the forage yield and quality of commonly available forage barley cultivars.
2. To evaluate orange lemma, hooded, awnless, and late maturity characters effects on barley yield and quality.

MATERIALS AND METHODS

- ✓ Location: Fargo, ND
- ✓ Years: 2005 and 2006
- ✓ 11 barley entries:
 - 'Robust', most widely grown 6-rowed malting barley
 - 'Horsford', 6-rowed hooded forage barley
 - Westford, 6-rowed hooded forage barley
 - Bestford, 6-rowed hooded forage barley
 - Haybet, 2-rowed hooded forage barley
 - Hays, 2-rowed hooded forage barley
 - 'Bowman', 2-rowed feed barley
 - Bowman isolines: orange lemma (Fig. 1 and 2), awnless, hooded, and late maturing
- ✓ Field design: Randomized complete block; three replicates
- ✓ Seeding rate: 296 seeds/m²
- ✓ Plot size: 1.82 by 6.69 m
- ✓ Harvest plot: 0.91 by 5.47 m
- ✓ Previous crop: Soybean (*Glycine max* (L.) Merr.)
- ✓ Maturity at harvest: When 5 consecutive random spikes were beginning soft dough.
- ✓ Forage quality components: Ash, crude protein (CP), acid-detergent fiber (ADF), neutral-detergent fiber (NDF), acid-detergent lignin (ADL), and in vitro dry matter digestibility (IVDMD) were determined by standard wet chemistry techniques by Marsha Kappan in the Animal and Range Sciences Department.



Fig. 1. Isolines of Bowman 2-rowed barley.

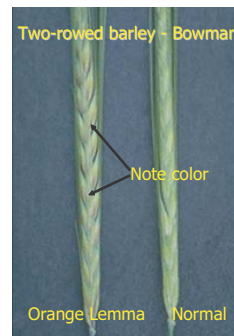


Fig. 2. Orange lemma character.

Entry	Harvest date	Forage yield Mg/ha	Quality component [†]								
			Ash	CP	ADF	NDF	ADL	CELL	HEMI	IVDMD	RFV
Bestford	2 July	11.0	139	116	317	532	43	274	215	624	112
Horsford	25 June	8.5	139	117	323	545	47	276	222	607	109
Westford	3 July	10.5	147	114	325	550	43	282	225	613	108
Haybet	1 July	9.1	135	116	316	541	42	274	224	608	111
Hays	29 June	10.1	136	117	322	542	38	283	221	657	110
Robust	24 June	9.5	154	120	310	539	46	264	229	601	112
Bowman (B)	23 June	9.5	154	121	317	547	43	274	229	587	110
Orange lemma B	23 June	9.3	142	128	311	547	40	271	236	621	110
Awnless B	23 June	9.5	158	129	321	548	43	278	228	581	109
Late-maturing B	27 June	8.9	131	128	326	562	39	287	236	621	105
Hooded B	25 June	10.8	149	119	319	538	46	273	219	583	111
Mean		9.7	144	120	319	544	43	276	226	609	110
LSD 0.05		1.0	24 [‡]	10 [‡]	14 [‡]	27 [‡]	5 [‡]	17 [‡]	15 [‡]	39	75 [‡]
CV, %		6.9	13.9	7.4	3.9	3.7	6.0	4.8	4.7	3.4	5.2

[†] CP=crude protein; ADF=acid-detergent fiber; NDF=neutral-detergent fiber; ADL=acid-detergent lignin; CELL=cellulose (NDF-ADF); HEMI=hemicellulose (ADF-ADL); RFV=relative feed value
[‡] F-test was non significant using the year by entry interaction

RESULTS

- ✓ Bestford, hooded Bowman, Westford, and Hays were the highest yielding entries while Horsford, late-maturing Bowman, and Haybet were the lowest yielding entries (Table 1).
- ✓ Ash, crude protein, ADF, NDF, HEMI, CELL, and RFV generally were non significant among entries over the two years (Table 1). Most were significant in the individual-year analyses; yet, the year by entry interaction was non significant for all characters except ADL and forage yield. The reason for this is unclear, but it may have been associated with the more stressful year in 2006.
- ✓ Hays barley had the highest IVDMD and lowest ADL in both years (Table 1).
- ✓ The orange lemma character is associated with reduced lignin content and the hooded character was associated with forage yield in Bowman isolines.

CONCLUSIONS

- ✓ Hays barley, a hooded 2-rowed cultivar, with its high IVDMD, low lignin, and better than average forage yield would be the recommended barley cultivar for forage production.
- ✓ Bestford barley, a hooded 6-rowed cultivar, with its highest forage yield and second greatest IVDMD would be a good alternative.
- ✓ Incorporating the orange lemma character into Hays or Bestford might reduce their lignin content and increase the forage quality.

REFERENCES

- Carr, P. 2004. 2004 cool season forage trial: Chemical fallow. Available at <http://www.ag.ndsu.edu/dickinson/04data/coolseason04.htm> (verified 8 Nov. 2006).
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