

## Comparison of different native barley varieties using an *in vitro* gas production technique using rumen fluid from fistulated and from slaughtered sheep as inocula

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**Introduction** Different barley varieties have been shown to affect *in vitro* dry-matter digestibility (IVDMD), ruminal starch digestion and animal performance (Boss and Bowman, 1996). Some of these differences may be due to differences in site and extent of nutrient digestion among barley varieties. Little information is available on digestive characteristics of different barley varieties and several native varieties are cultivated in eastern Azerbaijan province, Iran. An *in vitro* gas production technique was used to evaluate the effects of barley variety on gas production characteristics of barley grain. The treatments compared were 1) Sahand barley, 2) Abidar barley, 3) Sararud barley, and 4) Qarah barley. Also this study was carried out to compare the use of slaughtered sheep's rumen fluid as the source of microbial enzyme for the gas production technique with that of rumen fluid collected from fistulated sheep.

**Material and methods** Rumen fluid was provided by two fistulated sheep (2h after the morning feed), fed twice daily with alfalfa hay (400 g/kg) plus commercial sheep concentrate (600 g/kg). Different barley varieties were collected from several farms in the eastern Azerbaijan province, Iran. For the second method, rumen contents were removed from two healthy sheep immediately after their slaughter. Both rumen fluid collected from fistulates and from slaughtered animals were strained through four layers of cheesecloth before use. Gas production was measured using the method of Fedorak and Hruday (1983). Triplicate ground and dried samples of each barley variety (approximately 300mg) were weighed and placed in 50 ml capacity serum bottles; then bottles were incubated in 20 ml of buffered rumen fluid (buffer: rumen fluid, 2:1, v/v) for 48h. Gas production was recorded at 2, 4, 6, 8, 12, 16, 24, 36 and 48 h of incubation. The data at the different times was analysed using completely randomised design.

**Results** Results showed that gas production volume was greatest for the Sahand barley and lowest from the Qarah barley (Table 1). No significant difference between Abidar and Sararud varieties was observed. There was a relationship between *in vitro* gas production volume (ml/g DM), using fistulate rumen fluid (x), and *in vitro* gas production volume (ml/g DM) using slaughtered animal's rumen fluid (y) at different time intervals which suggests that rumen fluid from slaughtered animals can be used successfully for evaluating concentrate feedstuffs with the gas production technique (Table 2).

**Table 1** Effect of barley variety on *in vitro* gas production with fistulated sheep's rumen fluid (ml/g DM).

Time	Barley varieties				s.e
	Sahand	Qarah	Sararud	Abidar	
2h	27.5 <sup>ab</sup>	23.6 <sup>b</sup>	26.6 <sup>ab</sup>	30.3 <sup>a</sup>	0.94
12h	79.9 <sup>a</sup>	66.5 <sup>b</sup>	74.4 <sup>ab</sup>	81.8 <sup>a</sup>	1.82
24h	184.5 <sup>a</sup>	175.4 <sup>d</sup>	178.3 <sup>c</sup>	180.7 <sup>b</sup>	1.92
48h	206.5 <sup>a</sup>	198.2 <sup>c</sup>	203.1 <sup>b</sup>	203.2 <sup>b</sup>	1.33

Means in the same row with different letters (a, b, c, d) differ ( $P < 0.05$ ).

**Table 2** The relationship (simple x, y regression) between *in vitro* gas production volume (ml/g DM), using rumen fluid (x), and *in vitro* gas production volume (ml/g DM) using faecal fluid (y) in different time intervals.

Varieties	Incubation time	
	2h - 48h	2h, 12h, 24h, and 48h
Variance accounted for ( $r^2$ )		
Sahand	0.92	0.88
Qarah	0.96	0.94
Sararud	0.96	0.93
Abidar	0.95	0.93

**Conclusions** Our results showed that there is a significant difference between barley varieties in *in vitro* gas production and they have different starch degradation characteristics. These differences may be important since barley is a source of rapidly degradable starch in the rumen and lower amounts of it would lead to decreased production level, while an excess of rapidly digestible starch may increase incidence of disorders such as acidosis or bloat. In addition, our results suggest that rumen fluid from slaughtered animals can be used to evaluate concentrate feedstuffs in the *in vitro* gas production technique, thus eliminating the need for fistulated animals, and possibly reducing the costs of the method. The total gas production volume obtained using by slaughtered animal's rumen fluid was is higher than that obtained from fistulate rumen fluid and so mathematical correction might be needed.

### References

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