ID # 09-30

FORAGE QUALITY, YIELD AND PALATABILITY OF QUACKGRASS (*Elytrigia repens* (L.) Nevski)

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Abstract

Quackgrass (*Elytrigia repens* (L.) Nevski) is a competitive perennial invader of pastures and hay meadows which is frequently harvested as forage in mixtures with desired forage species. Field experiments were conducted to compare quackgrass with cool-season perennial grasses grown under the same soil and climatic conditions, in terms of forage quality, productivity, and palatability. The forage quality of the hays was influenced by the grass species. Quackgrass showed forage crude protein (CP) concentration that was equal to those of perennial ryegrass (*Lolium perenne*), reed canarygrass (*Phalaris arundinacea*) and Kentucky bluegrass (*Poa pratensis*), and greater than orchardgrass (*Dactylis glomerata*). The neutral detergent fiber (NDF) acid detergent fiber (ADF) concentration of the quackgrass was intermediate between those of perennial ryegrass and Kentucky bluegrass. Yields of quackgrass was equal to reed canarygrass, and greater than those of Kentucky bluegrass, orchardgrass and perennial ryegrass. The different hays did not affect the response of animals by feed intake. Quackgrass hay had higher phosphorus (P) and potassium (K) concentration, and lower calcium (Ca), magnesium (Mg) concentrations. Quackgrass was not to be inferior to other cool-season perennial grasses under frequent utilization.

Keywords: quackgrass, cool-season perennial grasses, forage, yield, palatability, nutritive value, frequent cutting

Introduction

Quackgrass (*Elytrigia repens* (L.) Nevski) is a competitive perennial grass, which is considered a noxious weed in the northern Japan. Quackgrass is difficult to control because of its rapid establishment, extensive spreading by rhizomes, and potential for seed reproduction. Some studies have been conducted to evaluate the forage potential of quackgrass. Marten et al. (1987) reported that the palatability of a broad-leaved quackgrass biotype was comparable with smooth bromegrass (*Bromus inermis*). Christen et al. (1990) indicated that the feeding value of quackgrass to sheep was comparable with that of timothy (*Phlenm pratense*). Animal yield from quackgrass exceeded that from timothy (Martineau et al., 1994). By contrast, no studies have been conducted to evaluate the forage potential of quackgrass in Japan.

This experiment was carried out to compare quackgrass with cool-season perennial grasses under the same soil and climatic conditions, in terms of forage quality, productivity and palatability.

Material and Methods

A field, naturally infested with quackgrass, was selected at the Tohoku National Agricultural Experiment Station, near Morioka city in Japan. Other cool-season grasses, orchardgrass (*Dactylis glomerata*), perennial ryegrass (*Lolium perenne*), reed canarygrass (*Phalaris arundinacea*) and Kentucky bluegrass (*Poa pratensis*) were collected from same field.The cutting schedule consisted of six harvests per year.

Forage yields were determined by mechanically cutting a 1 by 1 m area. Neutral detergent fiber (NDF) and acid detergent fiber (ADF) was determined by the method of

Goering and Van Soest (1970). Total nitrate was determined by the Kjeldahl method and crude protein (CP) concentration was obtained by multiplying N by 6.25.

Feeding trials were conducted with two growing steers (Japanese shothorn) for the animal fed the green forage at first cutting with container which filled each grass simultaneously. All containers were weighted every 20 minutes to determine intake of each hay.

Mineral concentrations were determined by atomic absorption spectrochemical analysis.

Results and Discussion

The forage quality of the hays was influenced by the grass species. The average CP content in the quackgrass was the highest (24.1%) of those of all grasses. Quackgrass had forage CP concentration which was similar ($P<0.05$) to those of perennial ryegrass, reed canarygrass and Kentucky bluegrass, and greater than orchardgrass. The NDF and ADF concentration of the quackgrass was intermediate between those of perennial ryegrass and Kentucky bluegrass. Our results agree with those of Marten et al. (1987) working with smooth bromegrass. Yields of quackgrass was equal to reed canarygrass, and greater than those of Kentucky bluegrass, orchradgrass and perennial ryegrass ($P<0.05$). Our results also support those of Sheaffer et al. (1990), who indicated that quackgrass forage yields did not differ consistently from those of reed canarygrass.

The different hays did not affect the response of animals by feed intake. These results agree with those of Martineau et al. (1994) working with timothy.

Martineau et al. (1994) reported no difference in mineral concentration in hays prepared from timothy and quackgrass. On the contrary, grass species differed in calcium (Ca), phosphorus (P), magnesium (Mg) and potassium (K) concentrations. Quackgrass hay had lower Ca and Mg concentrations than other grasses ($P<0.05$). P and K concentration were similar for quackgrass and perennial ryegrass.

Present results indicate that quackgrass has forage quality. So it is concluded that quackgrass has potential as a forage. However, establishment of quackgrass can not be recommended for use as forage because of its status as a noxious weed. None the less, we could substitute the utilization of quackgrass for the efforts to renovate stands.

Reference

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Table 1 - Crude protein (CP), neutral detergent fiber (NDF) , acid detergent fiber (ADF) concentration and yield, dry matter intake of forages

Grass	CP [a] (% dry wt)	NDF [a] (% dry wt)	ADF [a] (% dry wt)	Yield [b] (% dry wt)	Dry matter intake [c] (g $20min^{-1}$ $steer^{-1}$)
quackgrass	24.1a [d]	52.8ab	29.5ab	1179a	29.6a
reed canarygrass	21.2ab	54.9ab	30.9ab	1437a	32.0a
orchardgrass	19.4b	52.5ab	29.3ab	829b	29.5a
perennial ryegrass	22.4a	51.1b	28.3b	880b	-
Kentucky bluegrass	21.0ab	57.9a	33.0a	859b	-

[a] Values are means of each cutting

[b] Values are total of each cutting

[c] Values are means of eleven observations

[d] Different letters in same column correspond to a significant difference ($P<0.05$)

Table 2 - Mineral concentrations of calcium (Ca), phosphorus (P), magnesium (Mg) and potassium (K) in forages

Grass	Ca (% dry wt)	P (% dry wt)	Mg (% dry wt)	K (% dry wt)
quackgrass	0.24[a]c[b]	0.39a	0.13d	3.72a
reed canarygrass	0.29b	0.32b	0.19c	3.16b
orchardgrass	0.29b	0.32b	0.26b	3.69a
perennial ryegrass	0.53a	0.34ab	0.31a	3.72a
Kentucky bluegrass	0.31b	0.35ab	0.24bc	2.72c

[a] Values are means of each cutting

[b] Different letters in same column correspond to a significant difference ($P<0.05$)