

Using abandoned paddy fields for grazing in Northern Japan

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Introduction The number of abandoned paddy fields is increasing in Japan, because the government has been regulating rice production. It has been recommended that the abandoned paddy fields be used for stock raising. However, there is sometimes a lack of information about the land on the abandoned paddy fields and farmers want to know the cost of fencing and the best grass species to use. This paper seeks to provide farmers with information on how to begin to use the abandoned paddy fields as pastures in hilly rural areas in Japan.

Materials and methods Three aspects were considered. 1) Measurement of abandoned paddy fields: A handheld GPS (Garmin eMap) with an external antenna (GA27C) and tape measure (tape) were used to survey a flat land area with slender shape of about 0.38 ha and consisting of 11 small paddy fields in Morioka, Iwate. Results from the two methods were compared. 2) Construction of an electric fence including fence energiser, posts, galvanised wire, etc. The cost was compared with a conventional barbed-wire fence. 3) Grass species for abandoned paddy fields: Annual ryegrass (two commercial varieties), perennial ryegrass (one commercial variety) and millets for feed (two commercial varieties) were examined for water tolerance and productivity in a former paddy field where soil moisture was high.

Results Table 1 shows that there was no significant difference between the GPS and tape measurements of land area. The accuracy of the handheld GPS is around 4.8m, but this inexpensive GPS with its high performance and ease of use is ideal for measuring land for grazing. A barbed-wire fence cost (1,060Eur) is 1.4 times as expensive as an electric fence (754Eur) even in a small field of 0.38 ha with 344 m perimeter. Furthermore, electric fences require less labour to construct and cost less. Herbage yields and intakes are shown in Table 2. All species examined grew well in the high soil moisture conditions of the former paddy fields, but both yield and intake of annual ryegrass and millet species tended to be higher than perennial ryegrass.

Table 1 Comparison between measurements by handheld GPS with external antenna and tape measure about area and perimeter of a certain land (0.38 ha)

	GPS (A)	Tape (B)	Ratio (A/B*100)	t-test (P<0.01)
Area (m ²)	3,789	3,890	97.4	ns
Perimeter (m)	351	344	102.0	ns

Table 2 Hebage yields and intake in former paddy field

Species (CV)	Total yield	Total intake
	—(DMkg/ha)—	
Annual ryegrass (Nagahahikari)	5,450ab	4,925a
Annual ryegrass (Akiaboa)	5,127ab	4,377a
Millet (White Panic)	8,912a	7,654a
Millet (Green Millet)	7,378ab	6,300a
Perennial ryegrass (Friend)	4,055b	3,593a

The means followed by the same letter are not significantly different at the 5% level.

Conclusions Most abandoned paddy fields are located in hilly rural areas and usually are small with complex shapes. It is important to know the land areas for managing grazing on these fields. A handheld GPS with an external antenna is easy to handle and useful for surveying these fields easily and with reasonable accuracy. The electric fence is easy to use in these fields and the construction cost and labour are less than for a conventional barbed-wire fence. Annual ryegrass and millet species are suitable for former paddy fields.