Applications of ultrasonography in the reproductive management of *Dux magnus gentis venteris saginati*

A. M. KING, L. CROMARTY, C. PATERSON, J. S. BOYD

***Dux magnus gentis venteris saginati* is considered to be a Scottish delicacy; however, depleting wild stocks have resulted in attempts to farm them. Selective breeding has been successful in modifying behaviour, increasing body length, reducing hair coat and improving fank (litter) size. However, there are still significant problems associated with the terrain in which they are farmed. This article describes the use of ultrasonography in the reproductive management of this species and the introduction of new genetic material in an attempt to address these problems, with the aim of improving welfare and productivity.**

Dux magnus gentis venteris saginati (which translates literally as 'great chieftain o' the puddin' race'), more commonly known as the haggis, is an ancient creature that inhabits mountainous areas of the world. However, it is usually associated with the highlands of Scotland, where it is mentioned in the literature as far back as the year 10Oatcake (McCrumbly 10Oatcake). The Scottish haggis (*Haggis Scoticus vulgaris*) is a shy creature that is not commonly sighted in the wild (Fig 1). It has adapted uniquely to the inhospitable terrain in which it lives, in that its left ipsilateral pair of legs (membra thoracici et pelvine sinistra) are considerably longer than its right ipsilateral pair (membra thoracici et pelvine dextra), allowing it to graze along the steep mountain slopes towards the rising sun and move through the heather.

The wild haggis is a seasonal breeder with a gestation period of 56 days. Mating takes place on November 30, when libido increases as a result of the few wee drams partaken at St Andrew's night parties up in the glens. As a result of these indiscretions, most hagglets are born on January 25. It is also on this date that the annual cull of mature haggii takes place. With the stappit (pregnant haggs) safely in their burrows, the entire village helps to drive the rest of the haggis scuddle towards the end of the glen where, forced to turn abruptly in a confined space, they are incapacitated by their uneven leg length and lose their footing to tumble down into strategically placed nets. The size of the mesh is carefully regulated to ensure that only mature animals are ensnared. The writings of Rabbie Burns greatly increased the popularity of the haggis as a culinary delicacy (Burns 1786), and the day of the annual cull is now celebrated by Burns' suppers. However, because the harsh climate limits wild haggis fank (litter) size to only two or three hagglets, this increased popularity eventually resulted in it becoming an endangered species.

Most of the haggii for production in Scotland are now farmed to cope with demand, while preserving wild stocks.

FIG 1: A wild hagg (*Haggis Scoticus vulgaris*) grazes with her two hagglets on a steep slope. Note the long left pair of legs and the thick haircoat

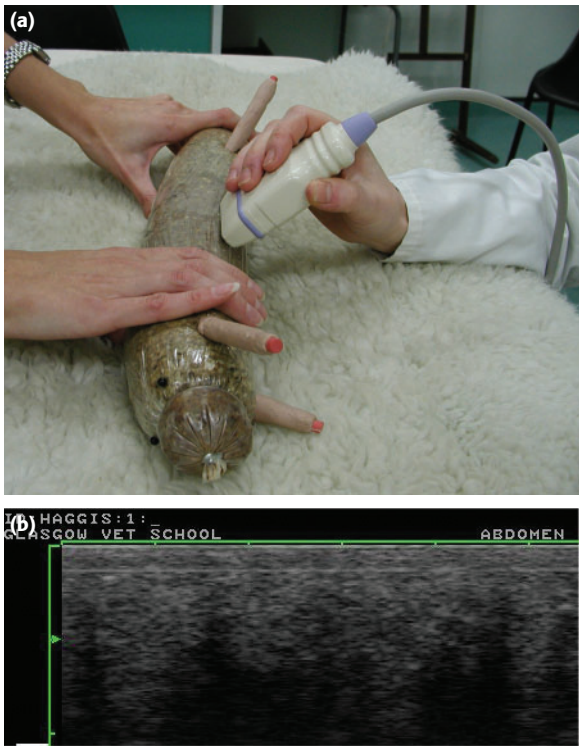

FIG 2: (a) Attempted transcutaneous imaging in a farmed hagg (*Haggis Scoticus vulgaris*). Note the absence of hair and the elongated body. (b) The thick subcutaneous fat layer prevented penetration of the ultrasound beam, preventing visualisation of the internal organs by this approach; (c) an intracorporeal approach was therefore required

Veterinary Record (2007) **160,** 94-96

A. M. King, BVMS, DipECVDI, MVM, DVR, MRCVS,
L. Cromarty, BSc,
C. Paterson, MVM,
J. S. Boyd, BVMS, PhD, MRCVS,
Institute of Comparative Medicine, University of Glasgow Veterinary School, Bearsden Road, Glasgow G61 1QH

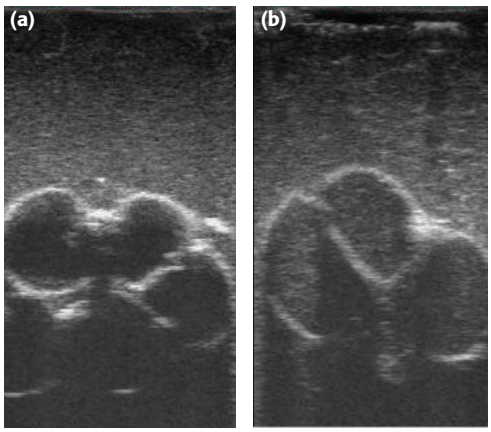

FIG 3: (a) The anechoic fluid-filled follicles and (b) echogenic corpora lutea in the ovaries of a farmed hagg (*Haggis Scoticus vulgaris*)

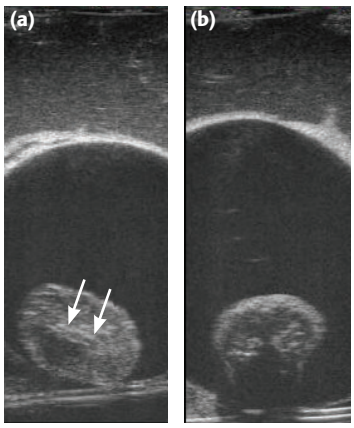

FIG 4: The developing embryo of a hagg (*Haggis Scoticus vulgaris*) at day 30 showing (a) the developing vertebral column (arrows) and (b) clearly visible limb buds

Selective breeding has successfully increased body length, reduced hair coat, modified (drinking) behaviour, reduced seasonality and increased fank size. However, the uneven leg length still poses a problem as it requires the provision of suitably inclined grazing. Attempts to rear haggii on flat ground in the lowlands resulted in a high incidence of 'falling-over disease', a condition similar to that affecting a large number of Scotsmen and veterinary students on a Friday night, and colloquially known as 'stoatin' fu" (McTipsy and others 1969). Although not usually fatal, it can cause significant nagging within the scuddle, which disrupts production.

The aim of the present project was to introduce genetic material from a variety of haggis from the southern hemisphere, *Haggis mundus novis*, also known as *Haggis backtofrontus*. This variety is membra dextra longa as opposed to the Scottish membra sinistra longa. The intention was to produce even-legged haggii (membra aequae) that could graze on flat land, thereby improving welfare and productivity under farmed conditions. Animal movement restrictions prevented the importation of a live male haggis or hagg from the southern hemisphere, and therefore artificial insemination was attempted for the first time in this species.

MATERIALS AND METHODS

An adult farmed Scottish hagg was scanned daily throughout the oestrous cycle using a Powervision (Toshiba) ultrasound system and a 12 MHz linear transducer. At ovulation, the hagg was sedated using 4 drams/kg uisge bheath (Whyte and MacKay) and artificially inseminated with imported frozen southern hemisphere haggis semen. The hagg was scanned daily until pregnancy was detected and then throughout gestation until parturition at 56 days.

RESULTS

The thick subcutaneous fat layer that the haggis has evolved to withstand the Scottish climate prevented penetration of the ultrasound beam and imaging of the internal organs via the transcutaneous route (Fig 2a, b); an intracorporeal route was therefore adopted (Fig 2c). This approach required the administration of more of the sedative, which was well received by the hagg.

The ovaries were identified, and before ovulation each contained a number of anechoic fluid-filled follicles (Fig 3a). Following ovulation, the developing luteal tissue appeared echogenic (Fig 3b). The hagg conceived to a single insemination. Pregnancy was first detected at 19 days following ovulation as a series of anechoic, spherical embryonic vesicles, with the embryos becoming visible at day 21 as small echogenic structures demonstrating a heartbeat. At day 30, the embryos were oval in shape and the developing vertebral column and limb buds could be visualised (Fig 4a, b). The embryos rapidly increased in size and by day 50 the subcutaneous fat layer had developed, which prevented penetration of the ultrasound beam and imaging of the internal organs. However, the mineralising limb bones were clearly shown on the scan, and careful examination revealed the limb length in several fetuses (Fig 5a, b). In male fetuses, the sporran pouch was clearly visible between the hindlegs (Fig 5b), presenting an important feature for in utero sexing in this species.

The resulting fank contained nine hagglets (Fig 6). Two were membra dextra longa, two were membra sinistra longa, four were membra aequae with an intermediate leg length, and the remaining hagglet was membra diagonale longa, which was an unexpected occurrence (Fig 7).

DISCUSSION

This is the first report of ultrasonography being used in the management of reproduction in the haggis. It successfully identified ovarian structures and allowed the detection and monitoring of pregnancy. Information regarding leg length

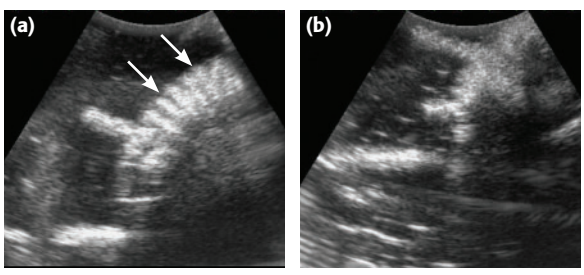

FIG 5: Haggis fetus at day 50; the subcutaneous fat layer had developed (arrows), preventing penetration of the ultrasound beam and imaging of the internal organs. (a) Fetus in membra aequae state. (b) Fetus in membra sinistra longa state. The sporran pouch is clearly visible, indicating that this is a male fetus

FIG 6: Farmed hagg (*Haggis Scoticus vulgaris*) and her fank of nine hagglets at two days old

FIG 7: Two hagglets just before weaning. The hagglet on the right demonstrates the desired membra aequae state, whereas the hagglet on the left (hagglet 9) shows the unexpected membra diagonale longa state

and sex was also obtainable, which is likely to be important in future breeding programmes.

In addition, this is the first report of the use of artificial insemination in this species. Such ancient species often do not tolerate artificial interference with their reproductive patterns. However, the genetic tendency of this species to find 'uisge bheath' irresistible makes them an easy-going and friendly species to work with.

The production of a hagglet that was membra diagonale longa was a worrying occurrence. This state has been reported to occur in the wild as a mutant variant where affected animals cope by grazing the sides of narrow ditches and streams with their two long legs in the water and their two shorter legs on either bank. However, their anatomy predisposes them to recurrent bouts of 'falling-over disease' (McTipsy and others 1969), although some observers claim that they walk straight and upright at Hogmanay after the ingestion of large volumes of uisge bheath (D. R. Stalker, personal communication). Membra diagonale longa hagglets are therefore undesirable in the farmed variety, and further work will involve attempts to increase the proportion of the fank that are membra aequae while reducing the incidence of this mutant state.

ACKNOWLEDGEMENTS

The authors thank M. Paterson for selflessly sacrificing his 'Hey, Jimmy!' wig and N. Milne for fearlessly restraining the hagg during the ultrasound examinations.

References

BURNS, R. (1786) To a Haggis. *Caledonian Mercury.* December 20, 1786

MCCRUMBLY, I. M. (10Oatcake) Ye olde haggis. In McCrumbly and Wrinkle's Guide to Ancient Scottish Beasties. 1st edn. Auchinshoogle Press. pp IV-X

MCTIPSY, R. U., STEAMER, A., SHED, P. I. & WHISKY, M. A. C. (1969) Falling over disease in Scotsmen, students and haggii as a result of inappropriate ground levels – honest! *Prohibition Monthly* **1,** 1-3

Authors' note

No haggii were harmed during this study. Hagglet 9 has been rehomed to a little old lady in Plockton who has called him Hamish, and he is living happily on a diet of hand-picked heather and Old Pulteney.

On a serious note, this work is entirely fictitious (apart from one scientific fact – haggis contains too much fat and air for ultrasound to penetrate at diagnostic ranges). It is being published to coincide with Burns Night (January 25) and its intent is pure and harmless fun.