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PRODUCTION OF GOAT MEAT FOR THE HALAL MARKET

by

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Abstract

This research project aims to increase production of meat produced in accordance with Norwegian regulations and Muslim traditions (Halal) and in particular develop production systems to meet the off-seasonal demand for fresh meat of goat kids for religious celebrations. The Norwegian Muslim Community of 50-100 thousand people as well as growing Muslim communities in neighbouring countries represent an interesting market for high quality goats' meat from Norwegian mountainous pastures. A food processing company (Alfathi Ltd.) has developed a range of Halal products such as pizzas, sausages and hamburgers. Rules of Halal slaughtering have been agreed upon with the veterinarian authorities.

Using a linear programming model the economy of cashmere goats has been compared with sheep for six farms from the fjord and mountain areas in southern Norway. The Halal meat production system has to be sufficient flexible to meet fluctuating seasonal demand of fresh meat over time and this can be achieved by altering kids age at slaughtering, feeding intensity, use of outfield pastures or intensive feeding systems. According to EU veterinary regulations the spinal cord has to be removed when slaughtering sheep and goats older than one year. Problems due to this regulation as well as production of Halal meat on surplus dairy goat kids are also discussed. Currently on dairy farms, surplus kids are culled shortly after birth.

1. Introduction

Norwegian sheep and goat meat has traditionally been sold on the national market. Meat from old dairy goats is used in different kinds of dried sausages while surplus goat kids are culled and disposed just after birth. In post war times the production and consumption of mutton has increased slightly while pork and poultry meat have gained popularity. The production of beef has been hampered by decreasing number of calves following a reduction in number of milking cows, and a slow growth of the suckler cow industry. Sheep farming combined with i.e. forestry, fishing or work or business outside the farm has become the most common activity on smaller farms in rural areas. This trend has been supported by political measures making sheep farming an important industry for rural settlement.

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Norway has traditionally had a system of summer grazing on open ranges and forested areas by cattle and small ruminants, but in post war times grazing by cattle has decreased substantially (Asheim and Hegrenes, 2006) and today about 68 percent of the outfield pasture feed intake is by sheep and 2 percent by goats. The Norwegian sheep system has been described by Asheim and Mysterud (1999) and its effects on the environment are ambiguous. Sheep, and in particular goats, may be interesting in a World Trade Organization (WTO) context since grazing is important for maintenance of an open and diversified countryside and enhance biodiversity of plants. Sheep are, however, vulnerable to predation and the recent increase in the number of brown bears, wolverines, wolves, lynx and golden eagles is a serious threat to the industry and has resulted in a political clash between farmers and environmentalists.

The Norwegian consumption of mutton per capita is only five kg per annum and consumption of goat's meat is negligible. The industry is looking for opportunities for growth. Increased tourism and health consciousness has resulted in growing interest for Mediterranean cuisine in which lamb and kid's meat play an important role. The number of Norwegians originating from countries accustomed to these types of meat, in particular Muslims, is also increasing. Many special recipes are based on meat from free ranging small ruminants, and thus the market for such meat in Norway has not been fully recognized. In order to utilize these market opportunities, Alfathi Ltd. was established in 2001 with Norwegian Meat Ltd, the Islamic Council of Norway and University of Life Sciences (UMB) as stakeholders.

An increased demand for lambs and especially kid's meat has been noted in connection with "*id al-fitr"* that takes place after Ramadan and *"Id al-adha"* that takes place after the pilgrimage. For Muslims, only meat from animals slaughtered according to Islamic regulations can be consumed. Especially in rural Norway, such meat is rarely available thus representing an interesting challenge to the sheep and goat industry. The rules of Halal slaughtering have been agreed upon with the veterinarian authorities. In accordance with Norwegian veterinary regulations animals has to be stunned with electricity before bleeding off while Islamic regulations are supervised by respected Imams from the most important Mosques.

Alfathi has been rather successful with introduction of Halal – pizzas, hamburgers and different sausages as the main products in addition to sale of whole lamb and kid carcasses, especially for the above mentioned holidays. Animals for this purpose which fetch a high market price should be of a certain quality and slaughtered just before start of the holidays, hence the operation need to be carefully planned from farmers located in rural Norway to the customers normally found in the Oslo fjord area. A facility for Halal slaughtering has been established at Gol, a municipality in the central mountain areas of southern Norway about 200 km north-west of Oslo. Much of the inner fjord areas in the west and the mountain range to the south, west and north are within the maximum time for carrying live animals (8 h) from the facility. Farmers in this area may consider goat farming as a supplement to sheep.

The paper looks at the farm economy of replacing sheep by cashmere goats. A linear programming model developed to represent two sheep farms in fjord area and four farms in the mountain area is briefly described in section 2. In section 3 studies of six production systems with slaughtering of goat kids at ages from 8 to 15 months in either of the areas are presented. The sections 4 and 5 conclude the discussion by drawing attention to opportunities and some further problems in this production system and how they can be dealt with.

2. Model

A linear programming model maximizing farm profit (see definition in MAFF, 1978) in the price level of 2005-06 has been worked out for the study. The model has been built in Excel and is based on data in the records of six sheep farms from the farm statistics of the Norwegian Agricultural Economics Research Institute (NILF, 2005a). The farms are located in southern Norway, in the counties neighbouring Gol, two in the fjord area and four in the mountain area. The farm records include data on farm size, yields, animal production and variable and fixed costs. The records are supplemented with data regarding animal feed requirements, standard yields and use of variable inputs (fertilizers etc) for meadows, green fodder and pastures on farmland, prices and labour input for crops collected from Handbook of farm planning (NILF, 2005b). Variable fuel and machinery costs are based on studies by Hegrenes (1985), Larsson (1983) and Lønnemark (1971). The yields on each farm were adjusted to the average for the years 2003 and 2004, considering farm roughage production, purchase of concentrate and other feed.

The dates for lambing and first day on spring, summer and autumn pasture was assessed for each farm depending on its location. The farms along the fjords in have a longer grazing period than the inland farms. Most farmers prefer a short in-door feeding period after lambing. Lambs are normally slaughtered in September-November either directly from the outfield pastures or after a short period grazing on farmland in the fall. In order to reach maturity, smaller lambs may also be fattened in-doors for a period. For each farm the slaughter date of lambs was specified to make the production of meat per ewe equal to the recorded values. One of the farms had great losses of lambs, presumably due to predation. Labour input in feeding and management during the barn-feeding, lambing and grazing periods were based on a study by Brattgjerd, (1993). Daily labour input is highest during indoor feeding, hence farmers in areas with a long grazing season use less time on the sheep.

The amount of available family labour was adjusted so that the number of sheep in a basic run was quite close to the recorded figures for 2003 and 2004. Four of the farmers used more time than the standard and were in accordance with Brattgjerd (1993) assumed to spend the extra time on maintenance thus lowering the time available for sheep farming. Two of the farmers used considerably less time and their sheep labour requirement were calibrated accordingly. Feeding is the main activity indoors and labour with goats will depend on their feed requirement relative to that of sheep. Goats also require considerably less supervision at kidding compared to lambing, but combing cashmere fibre is more time consuming than shearing of sheep. Supervision of ewes or does during the grazing period were assumed to be similar. While kids and lambs are borne at the same time kids have to be fed longer depending slaughter time. The extra time per day is assessed to 0.1 minutes per animal on the basis of studies at two farms during 2004 and 2005. The kids are assumed to graze on outfield pastures the second summer.

The results of the calculations are converted into Euro at an exchange rate of one Euro equals 7.91 kroner. Farmers obtain an extra payment of € 2.3 per kilo for meat of kids delivered before December 31 and € 2.9 for kids delivered after that date. Premiums are the same for suckler goats and sheep, € 75.6 for the first 75 animals older than one year on December 31 and € 14.3 for the remaining. Farmers also obtain relief payment of € 44.5 for the first 142 breeding stock animals. Veterinary costs are assumed to be the equal for sheep and goats, however, male goats have to be castrated thus incurring an extra cost of € 6.3 per male kid.

Wool prices and cost of shearing has been considered for sheep and cashmere fibre and combing for goats and kids.

3. Results

It is possible to vary slaughter time of goat kids throughout the year for all farms, however the analyses assume the following ages of kids when slaughtered:

- Five months old in September-October, all farms,
- Seven months old in November-December, mountain farms,
- From 9 to 11 months in January-March after a barn-feeding period, fjord farms,
- From 13 to 14 months in May-June after a barn-feeding period, fjord farms,
- From 15 to 16 months in June-July, 15 months from pasture, mountain farms.

Table 1 depicts the results with the current system i.e. sheep only compared to 50 percent of each animal and goats only in the farm breeding stock. The table reveals that profit in sheep farming varies considerably among the farms from about zero on farm M1 to € 15,959 on farm M4. Measured on an hourly basis, farm M2 had the highest profit, around € 25. Obviously this farmer was able to get the work done in considerably less time than the others. One reason for the result is differences in fixed costs. Differences in production results per ewe are also of importance. All farms have around ten breeding sheep per hectare of farmland apart from the farm M1 that only have five. Farm profit is about zero on this farm due to high investments and hire of farmland that has not yet been fully utilized. Still this result may be better than giving up farming since the fixed costs will still be there.

Table 1. Farm profit 2005-06 and profit per h for six farms with sheep only, equal number of sheep and goats, and goats only and five months old kids.

	Fjord farms		Mountain farms			
	F1	F2	M1	M2	M3	M4
Farm area, hectare	6,2	9,4	15,3	10,5	11,6	12,6
Family labour input h/year	1115	1919	1250	502	1359	1987
Breeding stock, sheep	65	99	77	73	111	110
Farm profit, 2005-06, Euro	5630	14451	1	12706	8485	15959
Profit per hour, Euro	2,9	7,5	0,0	25,3	6,2	7,0
Breeding sheep and goats	77	126	88	104	142	125
Farm profit, 2005-06, Euro	6019	14253	-1703	14085	6971	14869
Profit per hour, Euro	3,1	7,4	-1,0	34,0	5,4	7,0
Breeding stock, goats	94	142	91	106	142	138
Farm profit, 2005-06, Euro	6182	11387	-3865	12494	2480	13184
Profit per hour, Euro	3,2	6,6	-2,6	60,5	3,0	7,0

On farm F1 profit increased slightly by changing to goats, and on M2 a mixture of sheep and goats was most profitable. On the farms F2 and M4 a mixture of sheep and goats were about as profitable as sheep only. However, goat farming was unable to compete with sheep on the other farms, partly due to a limit on premiums for relief which is only granted to the first 142 animals of sheep or goats in the breeding stock.

The results when kids are fed until December or February are shown in Table 2. The same farms (F1 and M2) were able to increase profit with a mixture of sheep and goats compared

with sheep only. But the difference in profit is small. Farm M2 was able to increase profit per h considerably due to lower labour requirement for goats than sheep. For the other farms profit was lower for goats than sheep; however on the farms F2 and M4 were able to obtain about the same profit per h with the mixture as with sheep only. Table 3 shows the results with the longer feeding period of 13-14 months for the fjord farms and 15 months for the mountain farms.

Table 2. Farm profit 2005-06 and profit per h for six farms with sheep only, equal number of sheep and goats, and goats only and 7 or 9 months old kids.

	Fjord farms		Mountain farms			
	F1	F2	M1	M2	M3	M4
Farm area, hectare	6,2	9,4	15,3	10,5	11,6	12,6
Family labour input h/year	1115	1919	1250	502	1359	1987
Breeding stock, sheep	65	99	77	73	111	110
Farm profit, 2005-06, Euro	5630	14451	1	12706	8485	15959
Profit per hour, Euro	2,9	7,5	0,0	25,3	6,2	7,0
Breeding sheep and goats	75	124	84	104	142	119
Farm profit, 2005-06, Euro	6608	14282	-1996	13509	6330	14594
Profit per hour, Euro	3,4	7,4	-1,2	32,2	4,9	7,0
Breeding stock, goats	90	142	85	104	142	123
Farm profit, 2005-06, Euro	6133	11149	-4323	11445	1627	12746
Profit per hour, Euro	3,2	6,3	-2,9	52,5	2,0	7,0

Table 3 reveals much of the same picture as the previous tables; it does not make much of a difference how long the kids are fed before slaughtered. The extra income due to higher price and slaughter weights are offset by higher costs. The same farmers seem able to obtain a higher profit with a mixture of sheep and cashmere goats than sheep alone in particular when the amount of available labour is low.

Table 3. Farm profit 2005-06 and profit per h for six farms with equal number of sheep and goats and with goats only and 13 or 15 months old kids.

	Fjord farms		Mountain farms			
	F1	F2	M1	M2	M3	M4
Farm area, hectare	6,2	9,4	15,3	10,5	11,6	12,6
Family labour input h/year	1115	1919	1250	502	1359	1987
Breeding stock, sheep	65	99	77	73	111	110
Farm profit, 2005-06, Euro	5630	14451	1	12706	8485	15959
Profit per hour, Euro	2,9	7,5	0,0	25,3	6,2	7,0
Breeding sheep and goats	73	122	79	104	142	118
Farm profit, 2005-06, Euro	6577	14360	-1166	14076	7651	15498
Profit per hour, Euro	3,4	7,4	-0,7	31,8	5,8	7,3
Breeding stock, goats	89	142	74	104	142	125
Farm profit, 2005-06, Euro	6308	11518	-2697	12579	3979	14632
Profit per hour, Euro	3,2	6,4	-1,9	47,9	4,5	7,7

The results thus do not contrast findings in a study by Asheim et al. (2004) in which it was concluded that a change from sheep to cashmere goats would not be profitable unless labour input was at least 15 percent lower for goats than sheep.

4. Discussion

Cashmere goats were introduced in Norway in 1995 and today herds have been established in much of the country. Recent crossbreeding with Scottish bucks allows for a broader gene-pool and higher fibre yield (Clemetsen & Eik, 2002). A Norwegian Cashmere Association has also been established and its main objective is an economical sound goat production system based on *meat* (Alfathi Halal Ltd.), *landscaping*, and c*ashmere products* (Oleana Ltd.).

Small amounts of meat and lack of uniform meat quality are major obstacles to successful marketing of goat's meat in the country. Goat kids younger than one year with minimum seven kg carcass weight and good confirmation are sold on a contract basis for the Id celebrations. This year co-operating farmers got around € 6 per kg for kids meat which is a substantial improvement. Meat from older animals is sold, but currently it has not been possible to raise the price over € 1 a kilo.

Still our study shows that it is possible for some sheep farmers to achieve an economic return in line with that of sheep. Increased interest for kid meat, perhaps due to the special taste of outfield pasture, is also observed for other consumer groups indicating that the price level may be maintained in spite of the increase in production currently taking place. A more dramatic shift in production pattern on Norwegian sheep farm remains unlikely before the market demand for such meat is increasing and that may take some time. To achieve a stronger growth in the production the payment for such meat has to be increased further- one way or another. Except for one farmer in our study, income in all production systems was low compared with off farm work and thus goat production competes best in areas with few alternative employment opportunities.

The proposed system works by changing slaughter date for kids each year. When the religious celebrations occurs around the time of kidding this may involve problems with the EU scrapie regulations, i.e. removal of spinal cord for kids older than one year. Carcasses for the *Id al-adha* celebration must be intact. Curtailed products are still useful for barbeque and also for *Id al fitr*. To meet this requirement the time of kidding has to be moved and that can become impractical. One solution might be to apply for an exemption from the EU regulation in such years. Another possibility would be to feed surplus kids from dairy goat farms. Time of kidding is more widespread from late fall to April-May on dairy farms. Cashmere goat farmers may purchase 2 months old kids and keep them with the other goats. However the carcass conformation of dairy goat kids is inferior compared with cashmere kids.

Unimproved rangeland, kept open over centuries by grazing animals, notably sheep and cattle, is an important part of the Norwegian cultural heritage and important for recreation for local people and visiting tourists. However, due to reduced grazing and perhaps also climatic changes this landscape type is undergoing reforestation processes with detrimental consequences for its recreational value. In total, the harvest decrease in outlying pastures has been dramatic; 740 versus 303 million feed units were harvested in 1939 and in 1996 respectively (Hegrenes & Asheim, 2006). More profitable grazing is probably the most realistic solution to the problem; this will require the development of an efficient anti-encroachment management strategy.

An appropriate mixture of grazers and browsers may be the most promising way to enhance such a strategy. However, while free ranging sheep disperse widely into the range pastures where they tend to make small flocks of just a few animals per square kilometre goats are

currently present in insignificant numbers on Norwegian ranges. Most of them are also kept for the milk and on areas close to a summer milking shed. A production system with suckling goats, quite similar to that of sheep might become a more efficient management tool for maintaining open and diversified landscapes. Cashmere goats, kept under extensive feeding systems, has proven to be a biological efficient tool for controlling bush encroachment of open rangeland under Norwegian condition (Berg & Kjellberg, 2004, Bjureke, 2001; Dahle, 2006; Bryn et al., 2003). Norwegian dairy goats are kept under high level of feeding with subsequent less use of browse and shrubs. The surplus goat kids are either slaughtered for meat at a young age or culled after birth. Rearing such kids until the end of one or preferably two grazing seasons, would allow for increased use of trees and browse.

Governmental policies are therefore changing, allowing for increased support for production systems utilizing rangeland. Sheep and goat farmers should take advantage of this. In Hordaland the county allocates extra support for farmers keeping non-milk-producing goats for landscaping purposes; this support amounts to €55 per animal between one and two years of age. Such extra support would require kids to be at 16-17 months when slaughtered, but would presumably make goat farming more profitable than sheep.

Finally the cashmere fibre is collected for dehairing in Scotland in co-operation with Scottish producers. The textile designer company Oleana buys 200 kg fibre per annum at prices somewhat above world market; £ 80 a kg. Their 2005 collection of scarves and wrist warmers are just on the market. The cashmere fibre is following the world market more or less while national wool prices are well above world market prices.

5. Conclusion

Currently about 1-2 percent of the Norwegians or 50-100 thousand people are Muslims and there are larger communities in nearby Sweden and Denmark. Sheep and goat production is low in both Sweden and Denmark. In Europe the Muslim population is about 7 percent ranging from about 3.1 in Switzerland to 10 in France. Driven by immigration and high birth rates the Muslims population in Europe has increased and is expected to continue doing so. (See:http://www.islamicpopulation.com/europe_islam.html00). However, it may take some time before immigrants acquire an income comparable to other Norwegian. In the end the growth of the Halal meat production likely will be determined by the market demand.

Targeting special consumer groups and seasons may be a viable path for improved farm income in the small ruminant sector. In order to improve farm income, control and maintenance of landscapes has to be promoted as part of the systems. A system with several independent sources of income is also advantageous considering the price risks for the different products.

6. Literature

Asheim, L. J. & A. Hegrenes, 2006. Verdi av fôr frå utmarksbeite og sysselsetting i beite-baserte næringar. (Value of feed from outfield pastures and employment in pasture based industries). Notat Nr. 2006-15. Norsk institutt for landbruksøkonomisk forskning, Oslo. ISBN 82-7077-657-2. ISSN 0805-9691. (In Norwegian).

Asheim, L. J., L. O. Eik, & I. Mysterud: Linear Programming Analysis of Sheep and Cashmere Goat Production Systems. Evolutions of sheep and goat production systems: Future

of Extensive Systems and Changes in Society. *OPTIONS méditerranéennes*. SERIE A: Séminaires Méditerranéens Numero A-61, 2004. pp 49-55.

Asheim, L. J. & I. Mysterud, 1999. The Norwegian Sheep Farming Production System. *OPTIONS méditerranéennes*. SERIE A: Séminaires Méditerranéens Numero 38, 1999. pp 249-254.

Berg, I. & Kjellberg, K.H., 2004. Effekter av landskapspleie med geit - på beite i sterk gjengroing (Effects of grazing goats on encroahed pastures). MSc.- thesis, University of Uife Sciences. Aas. (In Norwegian).

Bjureke, K., 2001. Effekten av beite på vegetasjonen på Hovedøya (Effects of grazing on vegetation at Hovedøya). Oslo kommune. Oslo. (In Norwegian).

Brattgjerd, S. 1990): Arbeidsforbruket i saueholdet. (Labour input in sheep farming). Melding A-011-90. Norwegian agricultural economics research institute, Oslo. (In Norwegian, English summary).

Bryn, A., L.O. Eik & O. Rygg, 2003. Beiting med kasjmirgeit på Golsfjellet (Grazing with Cashmere Goats on Golsfjellet). Sau og Geit (56) 2. Oslo. (In Norwegian).

Clemetsen, M. & L.O. Eik, 2002. Kasmirgeit. Ny produktutvikling og verdiskaping basert på kjøt, ull og landskapspleie (Cashmere Goat, rural development based on meat, fire, and vegetation control). Aurland Naturverkstad BA - University of Life Sciences. (In Norwegian)

Dahle, G., 2006. Bruk av styrt beiting med kasjmirgeit til vegetasjonskontroll langs jernbanelinjer (Intensive grazing by cashmere goats to control bush and shrub vegetation along railroads). MSc.-thesis, University of Life Sciences. Aas. (In Norwegian).

Hegrenes, A. 1985. Mekaniseringsøkonomi på enkeltbruk. (Mechanisation economics for individual farms). Norges landbruksøkonomiske institutt. Melding F-279-85. Oslo. (In Norwegian, English summary).

Larsson, R. 1983. Kostnader før maskinunderhåll i jordbruket. Større jordbruk och maskin-hållare. (Costs of maintenance of agricultural machinery). Sveriges landbruksuniversitet, Institutionen før arbetsmetodik och technik. Rapport 83. (In Swedish).

Lønnemark, H. 1971. Kostnader och kostnadsberäkningar för jordbruksmaskiner. (Costs and cost calculations for agricultural machinery). Jordbrukstekniska institutet. Meddelande nr. 340. Uppsala. (In Swedish).

MAFF, 1978. Ministry of Agriculture, Fisheries and Food, 1983: Definitions of terms used in agricultural business management. Lion house, Willowburn Estate, Alnwick, Northumberland NE66 2pf. Booklet 2269. Reprinted 1983.

NILF (2005a). Norwegian Agricultural Economics Research Institute: Account results in agriculture and forestry 2004. Annual publication. Oslo. (In Norwegian, English summary).

NILF (2005b) Norwegian Agricultural Economics Research Institute: The Farm Management Handbook 2005/2006. Oslo. (In Norwegian).