BRIEF COMMUNICATION: The potential of the New Zealand goat industry

RMC Smith[a]*, MR Scholtens[a], SR Lopez-Lozano[d], N Lopez-Villalobos[a], D Burt[b], L Harper[b], D Thomas[a], A Carr[d], D Gray[c], P Tozer[c], NM Schreurs[a]

[a]Institute of Veterinary, Animal and Biomedical Sciences, Massey University, Private Bag 11222, Palmerston North; [b]Federated Farmers of New Zealand, Box 715, Wellington 6140, New Zealand; [c]Institute of Agriculture and Environment, Massey University, Private Bag 11222, Palmerston North; [d]Institute of Food Science and Technology, Massey University, Private Bag 11222, Palmerston North 4442, New Zealand

*Corresponding author: Email: rebecca.mcsmith@gmail.com

Keywords: goat; production; value; dairy; meat; mohair

Introduction

The New Zealand goat industry is evolving and there is potential for expansion of its export products. The production and value of the New Zealand goat industry has been explored previously when the industry was in its infancy (Sheppard & O'Donnell 1979), at a time when Mohair production was seen to be 'the most profitable goat farming enterprise'. Since then major expansion has occurred in the production and export of dairy-goat products, and the production of quality Boer goat meat is under consideration. In order for further progress to be made, knowledge of the current production levels and value of the goat industry, and its potential for expansion is required. Using information describing the current situation of the goat industry (Scholtens et al. 2017) and the value of the goat (Lopez-Lozano et al. 2017), a model was created to estimate the current and potential production and value of the New Zealand goat industry by 2025.

Methods and materials

Dairy goat industry model

An industry model was developed to simulate the population dynamics and production of each of the three major production sectors; dairy, meat and fibre. The population dynamics were based on the number of kidding does currently in the national flock (Scholtens et al. 2017). The number of kidding does in each age class was estimated using a Leslie matrix (Leslie 1945) which is a calculation based on the combined cull and death rate of each age class, reported by farmers. From the total production estimated for each industry their total market value was calculated.

The average annual production of milk, fat, protein and lactose produced per doe per lactation were obtained from (Solis-Ramirez 2014) and multiplied by the number of does in each class. These values were summed to provide an estimate of the total milk and milk constituents produced by the dairy goat flock.

It was assumed that 80% of the total milk produced was processed into whole milk powder. This assumption was based on the knowledge that New Zealand Dairy Goat Co-operative processes 80% of goat milk produced to milk powder (Lopez-Lozano et al. 2017). The remaining milk produced was used for cheese production; 15% for feta cheese and 5% for soft cheese. The potential volume of cheese produced was calculated by dividing the volume of milk casein by the casein fraction of the cheese. Casein accounts for 85% of the total protein in goat milk (Lopez-Lozano et al. 2017). A milk-processing model was developed to estimate the yields of these cheeses assuming that the moisture contents were 53% and 66% in feta and soft cheese, respectively (Lopez-Lozano et al. 2017). The value of the dairy industry was estimated by multiplying the current average market value of the products ($/kg), by the volume produced.

Dry matter requirements for each age class were estimated from metabolisable energy requirement calculations (AFRC. 1993) and feeding regimes described by farmers. An estimate of the land requirements for each flock was calculated by dividing their total dry matter requirements by an average pasture production of 14,000 kg DM/ha/year. An additional 6 m²/goat was allowed for housing in the dairy industry (Scholtens et al. 2017).

To explore the potential production volume and value of the dairy goat industry, two scenarios were simulated. In the first scenario, the average milk volume per doe was increased by 10%. This could be achieved by selection of does for high production levels (Solis-Ramirez. 2014). In scenario 2, the lactating doe population was increased by 30%. The aim of both scenarios was to increase the production of whole milk powder for export to increase industry value.

Meat goat industry model

A model of the Boer-goat-meat industry was constructed on the same principles as the dairy model and an estimated population of 11,000 Boer goats. From population statistics provided by farmers, it was estimated that a third of the Boer goat population were breeding does (Scholtens et al. 2017), and 73 servicing bucks were required based on a recommended doe to buck ratio of 50:1 (Meat and Wool NZ 2008). The remaining goats in the population were kids. Kids that were not required as replacements were slaughtered at eight months of age for the production of chevon (goat meat) (Scholtens et al. 2017).

The total goat carcass weight produced in the year ended September 2016 was 1,363,547 kg (Statistics New

Zealand 2017). Population dynamics indicate that dairy contributes 25% and Mohair culls 4% of the carcass volume. The contribution from Boer goats was estimated to be 11%, (11,000 Boer goats and average carcass weight of 25 kg; Scholtens et al. 2017). The remaining 60% was attributed to feral goats. The value of the meat industry has been estimated by multiplying the average export value ($/kg carcass weight) by the total carcass weight produced for each carcass type.

Potential overseas buyers have contacted New Zealand farmers directly, seeking as much as 20 tonnes of Boer carcass meat (Scholtens et al. 2017). The scenario considered for the goat meat industry is based on the potential situation where Boer carcass production and exports is increased by 20 tonne.

Mohair industry model

A mohair industry model was created using an estimated population of 9,320 goats. Data collected from mohair farms over the duration of this study suggest 30% of the population are breeding does, 20% are wethers and 93 service bucks (using recommended doe to buck ratio of 30:1; Scholtens et al. 2017). The remaining 49% of goats are kids.

For each fibre class, the annual production was calculated by multiplying the current average annual production (kg/goat) by the number of goats (Scholtens et al. 2017). The result was then multiplied by the current

average value for each fibre class to get the value of the mohair industry.

Results and discussion

In the scenarios demonstrated in Table 1 the level of production was increased and channelled into milk powder production, where export markets in Asia would be exploited (Lopez-Lozano et al. 2017). The gross export receipts per hectare increased by 8.7% and 9.3% for scenarios 1 and 2 respectively.

The current market for surplus buck kids is limited. In scenario 2 the number of buck kids surplus to requirements increases by 30%; in this event a market for surplus buck kids would need to be created. The costs of processing and marketing were unable to be sourced in the project, consequently the net profit of the New Zealand dairy goat industry was unable to be estimated. Greater land requirements demonstrated in the scenarios in which production increased may increase the costs of production and limit the net profit.

Currently, New Zealand exports 62% of the total graded carcass weight produced representing 846 tonnes (Statistics New Zealand 2017). Table 2 indicates an increase in export volume of 20 tonnes, and would require the current estimated Boer goat population to increase by 12.5% (~1375 goats). There is a high demand for goat meat overseas, but currently New Zealand does not have

Table 1 An estimate of the current and potential production, market value and land requirements of the dairy goat industry in simulated situations in which the average milk production (kg milk volume/year) has been increased by 10% and the lactating doe population has been increased by 30%.

	Current situation		Scenario 1: average milk production of lactating does increased by 10%		Scenario 2: lactating doe population increased by 30%	
	Amount	Value ($/kg)	Amount	Value ($/kg)	Amount	Value ($/kg)
Lactating does	66,100		66,100		85,930	
Production per animal (kg/yr)						
Milk	771		851		771	
Fat	25		28		25	
Protein	24		27		24	
Lactose	36		40		36	
Live weight per lactating doe (kg)	85.7		85.7		85.7	
Number of culled does	8,593	6.93	8,593	6.93	11,171	6.93
Number of surplus buck kids	62,081	0	62,081	0	81,634	0
Industry production (kg/yr)						
Milk volume	51,127,706		56,240,477		66,466,018	
Fat	1,679,586		1,847,545		2,183,462	
Protein	1,607,240		1,767,964		2,089,413	
Lactose	2,418,340		2,660,175		3,143,843	
Whole milk powder	4,564,134	45	5,134,650	45	6,275,684	45
Soft cheese	596,405	70	596,405	70	596,405	70
Feta cheese	1,226,621	40	1,226,621	40	1,226,621	40
Industry gross income (million $/yr)		296		322		373
Land for housing (ha)	48		48		62	
Land for feed production(ha)	4,440		4,490		5,580	
Total land (ha)	4,490		4,540		5,640	

Table 2 An estimate of the current and potential production, export value and land requirements of the goat-meat industry in a simulated situation where Boer goat meat production has increased by 20 tonnes.

	Current situation		Potential scenario: Boer meat production increased by 20 t	
	Amount	Value	Amount	Value
Boer goat population	11,000		12,375	
Average carcass weight (CW) (kg)		($/kg/yr)		($/kg/yr)
Feral	9	6.93	9	6.93
Boer	25	30	25	30
Dairy cull	40	6.93	40	6.93
Mohair cull	25	6.93	25	6.93
Industry production (kg CW/yr)		($/yr)		($/yr)
Feral	820,855	5,688,527	820,855	5,688,527
Boer	159,535	4,786,050	179,525	5,385,750
Dairy cull	327,251	2,267,851	327,251	2,267,851
Mohair cull	55,905	387,425	55,905	387,425
Industry gross income (million $/yr)		13		14

the capacity to supply such export markets. The goat meat industry is limited, in part, by abattoirs restricting slaughter of goats to the off-season in favour of other production animals. In order to meet potential export demands, co-ordination between goat farmers and abattoirs would need to be improved, or dedicated slaughter facilities for goats would need to be built.

It was estimated that currently 31 tonnes of mohair with a value of approximately $665,000 is produced per year. Currently 15 tonnes of mohair is exported annually, with a total export value of $352,000 (Lopez-Lozano et al. 2017). The New Zealand mohair industry has the potential to produce 'weaving grade' fibre by importing genetics for superior quality mohair. Weaving fibre (over 115 mm in length) is worth approximately 10% more than the average New Zealand mohair fibre (Lynne Milne Chairman of Mohair NZ; personal communication, 2016). If weaving fibre can be produced, then the average export value of New Zealand mohair could increase to $1,380,000.

Conclusions

The New Zealand goat industry has changed significantly over the last decade. The dairy goat industry is currently the largest of the three sectors and has the greatest export value, while the Boer goat meat industry has the greatest potential for expansion if export demands can be met. The fibre industry demonstrates the lowest value of the three sectors but this has the potential to increase if the genetic base of the New Zealand Angora flock is improved.

Acknowledgements

References

AFRC. 1993. Energy and Protein Requirements of Ruminants. An Advisory Manual Prepared by the AFRC Technical Committee on Response to Nutrients. CAB Int., Wallingford, United Kingdom.

Barkley M, Knoll K, Kime LF, Harper JK 2012. Meat goat production. Ag Alternatives, PennState Extension. http://extension.psu.edu/business/ag-alternatives/livestock/sheep-and-goats/meat-goat-production [accessed 3 Mar 2017].

DairyNZ Feed values. https://www.dairynz.co.nz/feed/supplements/feed-values/ [accessed 3 Mar 2017].

Leslie PH 1948. Some further notes on the use of matrices in population mathematics. Biometrika 35: 213-45.

Lopez-Lozano SR, Scholtens MR, Smith RMC, Lopez-Villalobos N, Burt D, Harper L, Thomas D, Carr A, Gray D, Tozer P, Schreurs NM 2017. Assessing the current value of milk, meat and fibre products from the goat industry in New Zealand. Proceedings of the New Zealand Society of Animal Production 77: 173-176.

McGregor BA 2000. Meat, carcass and offal yields of goats. http://www.acga.org.au/goatnotes/H007.php [accessed 3 Mar 2017].

Meat and Wool NZ 2008. Farming goats for meat. Goat monitoring project No. 3. http://maxa.maf.govt.nz/sff/about-projects/search/04-059/farming-goats-for-meat.pdf [accessed 3 Mar 2017].

Mohair Pacific 2017. Mohair classing. http://www.mohairpacific.nz/index.php/profitability/mohair-classing [accessed 3 Mar 2017].

Mohair Producers 2016. Mohair classing guidelines. http://www.mohairproducers.co.nz/classing-guidelines/ [accessed 3 Mar 2017].

Progressive Enterprises 2017. Grocery; Mainland fresh cheese creamy goat feta. https://shop.countdown. co.nz/shop/SearchProducts?search=feta#url=/ Shop/ProductDe   tails%3Fstockcode%3D48602 3%26name%3Dmainland-fresh-cheese-creamy-goat- feta%26searchString%3Dfet [accessed 3 Mar 2017].

Scholtens MR, RMC Smith, Lopez-Lozano SR, Lopez-Villalobos N, Burt D, Harper L, Tuohy M, Thomas DG, Carr AJ, Gray DI, Tozer P, Schreurs NM 2017. The current state of the New Zealand goat industry. Proceedings of the New Zealand Society of Animal Production 77: 164-168.

Sheppard RL, O'Donnell DK 1979. A review of the New Zealand goat industry. Lincoln College Agricultural Economics Research Unit.

Solis-Ramirez J 2014. A genetic improvement programme for New Zealand dairy goats. PhD Thesis. Institute of Veterinary, Animal and Biomedical Sciences. Massey University, Palmerston North, New Zealand.

Statistics New Zealand (2017). Table: North Island, South Island by kill by animal type (Annual-Sep). Retrieved from: http://www.stats.govt.nz/infoshare/ ViewTable.aspx?pxID=9b47c6c1-1a94-4491-9650-8e7fe9236655

Vauron M 2017. Brie de Chevre - Goat Brie - price per 100g.   http://www.mvauron.co.nz/active/fdetail. asp?c=8000082 [accessed 3 Mar 2017].