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## A cross-sectional survey of New Zealand sport horse stud farms

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### Abstract

An online survey was sent to 74 sport horse owners. With a response rate of 45% (33/74) data were available from 33 owners of 74 sport horse stallions. Most stallion owners were female (29/33; 88%), aged between 35 and 54 years (25/33; 76%), and had equine occupations (17/33; 52%). Most sport horse stud farms were not operated as the primary income source for the owner (27/33; 82%). Farms had a median of 2 (Interquartile range (IQR) 1–3) stallions and a median of 5 (IQR 2–9) mares. There were four larger farms standing stallions that also provided frozen semen from stallions resident outside of New Zealand. Most stallions were privately owned (69/75; 92%) and 47% (35/74) of stallions originated from overseas. Half the stallions had their own performance record (36/75; 49%). Natural service was offered for 64% (47/74) of the stallions, 81% (60/74) of stallions were available via artificial insemination with fresh or cooled semen, and 37% (27/74) were available via artificial insemination with frozen semen. The number of mares covered by the stallions per season was heavily left skewed with a median of 5 (IQR 1–8). There were a small group of active sires ( $n = 7$ ) that covered larger books of mares with a median of 42 (IQR 22–50).

**Keywords:** horse; sport horse; breeding; stud farm; stallion

### Introduction

Within New Zealand the most documented equine industry is the New Zealand Thoroughbred racing industry (Tanner et al. 2013). This is in part due to the clear management/organisational structure for the breeding and racing of Thoroughbreds in New Zealand. In contrast, the use of horses for non-racing recreation and sport activities is very diverse. It is estimated that only 30% of the approximate 32,000 horses kept in New Zealand for equestrian sports including showjumping, dressage and eventing would be registered with the official governing body, Equestrian Sports New Zealand (Rogers & Wickham 1993; Rosanowski et al. 2012).

A high level of inter-exchange of genetic material and a strong performance based breeding objective, has seen many European sport horse breeding organisations focusing on producing a “type” of horse, rather than maintaining a breed (Koenen et al. 2004). In New Zealand, similar to the situation in Ireland, sport horses include animals with parentage of Warmblood, Thoroughbred and draft cross genetics (Rogers & Firth 2005; Friedrich et al. 2011). The diversity in the breeds, or genetic origin, of horses used in equestrian sport within New Zealand is complicated by multiple breed registration bodies competing for the registration of the subsequent progeny (Creagh et al. 2010). The lack of integration of these pedigree records from multiple bodies, with those maintained by Equestrian Sports New Zealand once the horse starts its sport career, exacerbates an endemically low compliance of official pedigree recording.

In recent years most literature examining the sport horse industry in New Zealand has focused on the suitability of performance data for genetic analysis,

the examination of wastage and loss of registered horses from sport (Friedrich et al. 2011; Creagh et al. 2012). There are limited data available on the breeding of sport horses and the production process prior to entry into equestrian sport, generally as a three or four-year-old (Rogers & Wickham 1993; Rogers & Firth 2006).

Within the New Zealand Thoroughbred and Standardbred industries there appears to be a relatively high level of homogeneity in the production process. Many farms have similar management systems and breeding regulations, certainly in the Thoroughbred industry. This is constrained by regulations allowing only natural service at mating, specifically excluding the use of artificial insemination and an imposed relatively short breeding season (Rogers et al. 2009; van Rijssen et al. 2010). In contrast, the Standardbred industry permits artificial insemination using fresh, cooled and frozen semen, and limited use of embryo transfer. These technologies translate to more efficient use of sires perceived to be of greater genetic merit (Rogers et al. 2009).

Much of our data and assumptions of sport horse production are derived from the European producers of sport horses as there are limited New Zealand data available (Rogers et al. 2012). Within Europe the production of sport horses is relatively tightly regulated with the level of vertical industry integration being similar to that observed in New Zealand for the racing industries (Wallin et al. 2001). However, the size of the breeding operations are generally small with most breeders having less than two broodmares and 60% of breeders identifying that sport horse breeding is a hobby and not a profession from which they derive income. Between 60% and 90% of European sport horse mares are bred via

artificial insemination, predominantly using fresh or cooled semen (Aurich & Aurich 2006).

The aim of this paper was to describe the demographics and breeding practices of a sample of sport horse breeders standing stallions advertised for commercial duties during the 2011/12 breeding season.

## Materials and Methods

### Definition of a sport horse

Within this study a sport horse was defined as a horse used, or bred for use, in the main equestrian sports of dressage, show jumping and eventing (Rogers & Wickham 1993).

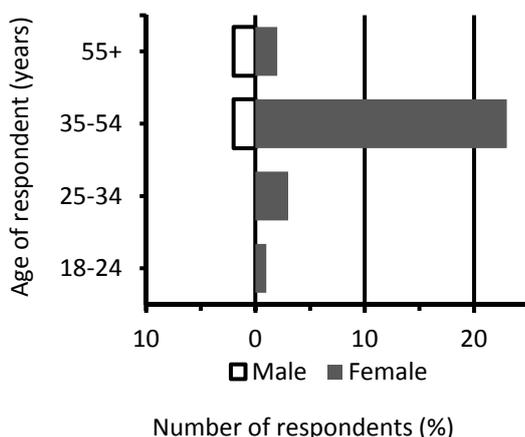
### Sample

The sampled group of sport horse breeders ( $n = 74$ ) were the owners or stud masters of sport horse stallions advertised as standing at stud in New Zealand within the two main equestrian press magazines (October 2011 issue of 'New Zealand Horse & Pony' and in the August-September 2012 issue of 'Show Circuit'). From these publications contact details were obtained and the owners or stud masters were emailed a cover letter describing the purpose of the survey. The cover letter contained a hyperlink to the online survey (SurveyGizmo, Boulder, Colorado, USA).

### Survey

The online survey consisted of a combination of 40 open, closed, and free-text questions. The survey was divided into three sections. In the first section containing stud respondent and stud farm demographics; questions were asked about age, gender, farm location, role in the business, farm size, the breeding objective for the operation, number of horses, number of stallions, and whether the equine breeding farm was run alongside another farming operation. The second section of the survey included questions on the demographics of the stallion such as

**Figure 1** Population pyramid of the 33 respondents in an online survey of sport horse stallions in New Zealand.



age, breed, ownership, career duration, origin, performance history, breed registration and mares covered. The last section included questions on the reproductive services of the stallion, such as the type of service offered, number of services per season, whether semen was shipped and who performed inseminations. The stallion section was repeated for each stallion at the farm. The survey was available online from August to September 2012. A reminder email was sent 3.5 weeks after the initial invite to participate in the study.

### Statistics

Data were downloaded from SurveyGizmo™ in Microsoft Excel format. These data were cleaned, with partially completed and duplicate surveys removed. Questions that were free-text, such as breed, were categorised into groups for analysis. The distribution of continuous data was assessed using histograms and median and interquartile range (IQR) is presented throughout for non-normally distributed data. Binary and categorical data are presented as counts and percentages. With multiple answers being accepted for some questions, the total numbers of replies may be greater than the number of respondents. All analyses were conducted in Stata 12 (Statacorp LP, College Station, Texas, USA).

## Results

### Sample population

Surveys were received from 41/74 (55%) respondents. There were seven partially completed surveys and one survey from a respondent not standing a stallion. Overall, 33/74 surveys were included in the analysis, resulting in a response rate of 45%. Of these 33 stud farms, eight (24%) were located in Canterbury, six (18%) in Auckland, five (15%) in Waikato, the Bay of Plenty and Manawatu each had three stud farms (9% each), Hawke's Bay and Wellington each had two (6% each), and Nelson, Northland, Otago, and Taranaki each had one stud farm (3% each).

### Demographics of respondents

Most stallion owners were female and aged 35 to 54 years (Figure 1), and had occupations in the equine industry (17/33; 52%). Most respondents were either the stud farm business owner (20/33; 61%) or stud master (11/33; 33%). The median total farm size was 12 ha (IQR 8–40 ha) and the median area for the equestrian breeding operation was 8 ha (IQR 7–18 ha).

**Stud farm**

The median number of stallions on a farm was 2 (IQR 1–3), with a median of 2 (IQR 1–5) and 3 (IQR 1–5) pregnant and dry mares, respectively. Overall, the ratio of mares to stallions was 2.7:1 (IQR 1.8–4.0:1). There were four larger farms standing stallions that also provided frozen semen from stallions resident outside of New Zealand. Most respondents (25/33; 76%) bred horses rather than ponies and most respondents bred “all rounders” (14/33; 42%) rather than specialist show jumping (7/33; 21%) or dressage (6/33; 18%) horses. When describing the breeding objective most respondents included versatility/trainability (n = 18) or quality horses (n = 15). Most (35/50; 70%) respondents sold the resultant progeny as either weanlings or yearlings. Most sport horse stud farms were not operated as the primary income source for the owner (27/33; 82%). In total, 30% (10/33) of respondents ran another farming operation alongside their equestrian breeding operation, of which most (7/10; 70%) were sheep and beef.

**Stallion**

Overall, the 33 respondents provided data for 74 stallions, of which most were described as Warmblood (Table 1). The median stallion age was 8 years (IQR 5–14 years) and the median number of years the stallion had been at the stud was 3 years (IQR 2.0–6.5 years). Many of the stallions had dual breed registration with most registered with the New Zealand Warmblood Society (n = 24), New Zealand Pinto Society (n = 10), New Zealand Sport Horse Breeders Association (n = 9) and New Zealand Holsteiner Society (n = 8). Most stallions were privately owned and almost half of the stallions originated from overseas (Table 1).

Half the stallions had their own performance record (36/74; 49%), with 10 stallions (28% of those with a performance history) having undergone central performance testing and licensing prior to importation. Most stallions with a performance history had participated in competition (28/36; 78%), nine (32%) in dressage (from Grade 3 to Grade 9/Grand Prix), 11 (39%) in show jumping (Age series classes to Grand Prix), 17 (61%) had been shown in-hand (assessment based on conformation and movement) and five (18%) in other disciplines including eventing, western, side saddle, endurance and racing.

The number of mares covered by the stallions per season was heavily left skewed (Median 5, IQR 1–8). There were a small group of active sires (n = 7) that covered larger books of mares (Median 42, IQR 22–50). The mares covered were described as either Sport Horse (Median 3, IQR 2–4), Warmblood (Median 3, IQR 1–10) or Thoroughbred (Median 2, IQR 1–5). There was a trend for these sires to cover multiparous

**Table 1** Demographic data of stallions included in an online survey of sport horse stallions in New Zealand.

Variable	Number of stallions	Percentage
<b>Breed</b>		
Warmblood	31	42
Sport horse	10	13
Other	33	45
Total	74	100
<b>Ownership arrangement</b>		
Privately owned	71	96
Leased	2	3
Syndicated	1	1
Total	74	100
<b>Did stallion start his stud career with current owner?</b>		
Yes	47	64
No	27	36
Total	74	100
<b>Stallion origin</b>		
Overseas	35	47
NZ breeder	24	33
Bred by surveyed stud farm	15	20
Total	74	100
<b>Where it is hoped the stallion’s progeny will excel</b>		
All rounder	37	50
Show jumping	17	23
Dressage	13	18
Showing	4	5
Eventing	3	4
Total	74	100

mares rather than maiden mares (Median 5, IQR 2–6 versus Median 2, IQR 1–3). There was no effect of breeding method on the numbers of mares covered by a stallion.

**Stallion reproductive services**

Most stallions were offered for natural service, most commonly service in-hand was offered (Table 2). Semen was available from most stallions as either fresh or cooled semen, whilst some stallions were also offered as frozen semen (Table 2). Most inseminations were performed by the stud master rather than a veterinarian on the stud farms (Table 2). Of the stallions from which semen was shipped to other locations (63/74), 67% (42/63) of stud masters stipulated that a veterinarian must inseminate the mares.

**Table 2** Stallion reproductive services in New Zealand as reported by respondents of a sport horse stallion online survey.

Variable	Number of stallions	Percentage
Offer natural service		
Yes	47	64
No	27	36
Total	74	100
Natural service		
In hand	33	45
Paddock breeding	2	3
Both	13	17
Unknown	26	35
Total	74	100
Artificial insemination fresh /cooled semen		
Yes	60	81
No	14	19
Total	74	100
Artificial insemination frozen semen		
Yes	27	36
No	47	64
Total	74	100
Who performs inseminations		
Stud master	30	41
Veterinarian	26	35
Other stud farm	3	4
Other	1	1
Unknown	14	19
Total	74	100

## Discussion

The sampled group of sport horse breeders was restricted to the stud farms with sires advertised within two commercial equestrian magazines. This may have biased the sample. However, the lack of a central registration body, or central register of stallions at stud, meant that the special breeding issues of both magazines became the default ‘unofficial’ list of sport horse sires at stud within New Zealand. Previous industry estimates place the number of sires at 300 and an annual foal crop of approximately 1,000 foals (Rogers & Wickham 1993). The present survey sampled a relatively heterogeneous group of sires, yet with very similar production parameters. The 74 sires surveyed therefore represented ~25% of the active sport horse sires within New Zealand and the relative homogeneity of the responses and agreement with other unpublished estimates would indicate a representative sample.

The typical New Zealand sport horse stud master was female and aged between 35 and 54 years and did not operate the stud farm as a primary income source. This is in close agreement with profile reported for German sport horse breeders (Aurich & Aurich 2006). The size and scope of the breeding operation was restricted to one or two sires and less than 10 mares.

There were a few farms larger than these, but they were the exception rather than the norm. The small size of the breeding operation limits the commercial viability of these farms which is reflected with most respondents identifying the farm as not being the primary income source. This pattern is very similar to previous estimates and to that described for sport horse breeders in Europe and Ireland with most breeders having one or two mares (Aurich & Aurich 2006; Fahey 2012).

Despite the apparent limited opportunity for financial return, given the small number of mares covered by each stallion, there has been significant investment by stud managers with the importation of performance tested Warmblood sires, generally from Europe. Within the racing industry, the risk of investment in a young sire is reduced by the syndication of the stallion into 40 to 100 shares. This has a two-fold advantage in initially distributing the purchase price across a number of individuals, but also means that each shareholder has a vested interest in ensuring the young sire covers the best mares and the progeny obtain a performance record. This approach does not appear to be utilised within the sport horse industry with most stallions being privately owned.

Within Europe many sport horse breeding organisations have a breeding objective that permits separate or specialised selection for jumping and dressage (Koenen et al. 2004). This specialised selection is due to the reported negative genetic relationship between jumping and dressage performance (Hellsten et al. 2006). However, there appears to be limited data relating to the breeding objective at the stud farm level. Within this survey most breeders identified they were breeding for “all rounders” rather than specialised lines which appears in contrast to the genetic composition of many of the sires they used. This “all rounder” approach may be a peculiarity of the sport horse market in New Zealand with many horses at the lower levels competing in one or more disciplines.

Commercial breeding farms within the racing industry actively aim to maximise the number of mares covered by a sire (>50 mares) within the first few years at stud to provide a return on initial investment, maximise the number of progeny entering race training and therefore increase the chance of having successful racing progeny to ensure commercial success. In the present study only four stallions covered around 50 mares per year, again reflecting the smaller scale and non-commercial reasons for sport horse breeding in New Zealand.

This study indicates that artificial insemination is widely available for sport horses in New Zealand. However, the details of how widely it is used, the degree of involvement of veterinarians or the use of specialist stallion collection facilities were not examined in this survey, nor the degree of reproductive management of mares. Although there have been increases in the quality and commercial use of equine frozen semen in the past decade the pregnancy rates

achieved are typically considerably lower than with fresh or cooled semen (Samper & Plough 2010). The use of frozen semen requires more intensive veterinary management of mares than other artificial insemination procedures, which is an additional cost to mare owners. Although survey respondents indicated that frozen semen was available from 37% of the stallions, the survey did not identify how often it was used by mare owners. We can speculate that perhaps sport horse stallion owners in New Zealand invest in frozen semen to broaden their stallion's availability to the mare population, and act as an 'insurance policy' in case of stallion death.

This initial examination of the breeding of sport horses in New Zealand supports earlier assumptions. Despite the geographical differences between New Zealand and Europe there were limited differences in the typical size of the breeding operations, the use of reproductive technologies and the non-economic goal of the breeding farm. The overall, rather than specialised, breeding objective of the farms may reflect the relative size of the New Zealand domestic market and the need for horses to be suitable for a variety of disciplines.

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