

Deer Industry Workshop

for Rural Professionals

2020



Deer Industry
New Zealand



P2P

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Course Outline

This course is a one-day snapshot into the deer industry and farming practice. It does not provide highly detailed information but does provide resources for your further reference.

This guide roughly follows the outline of the presentations along with more detailed information and references to further reading.

Reference material

- DINZ website: www.deernz.org
- Deer Facts: www.deernz.org/deer-facts
- Environmental Code of Practice: www.deernz.org/deer-hub/farm-environment/environmental-management-code-practice
- Deer Master (2000), Deer Production Guide: www.deernz.org/publications
- Deer Biology, Physiology and Farming
- Haigh and Hudson (1993) Farming Wapiti and Red Deer
- Proceedings of the Deer Branch of the New Zealand Veterinary Association.
- The Deer Farming Handbook Chris Tuckwell (2003) RIRDC Publication number 03/029 (Deer Industry Association of Australia)
www.deerfarming.com.au/deer-farming-handbook
- P2P resources, posters and apps – All available on www.deernz.org/dinz-activity/p2p-deer-industry-initiative or hard copies can be ordered from DINZ.
- Animal Welfare (Deer) Code of Welfare 2018, issued under the Animal Welfare Act 1999

Disclaimer: While every effort has been made to ensure these notes are accurate, Deer Industry New Zealand, Pania Flint and any other referenced person or organisation take no responsibility for any outcome whatsoever from following the advice herewith. The reader is encouraged to refer to a wide range of information sources and develop advice that is individually suited to each farm.

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1. History

A brief recap

Mid 1800s: Deer were introduced for sport but not farmed. They adapted well to the NZ native bush, multiplied to large numbers and caused considerable damage to native flora and fauna.

1930s: Deer were declared a noxious pest and government cullers employed. It took time to make an impact on numbers. The biggest gain was through the introduction of helicopters in 1950s. (See “The Deer Wars” documentary.)

1960s: Growing trade exporting products from wild deer.

1970s: Wild recovery operations in full swing.

1971: First licence to farm deer. Strict regulations for fear they would escape.

1975: New Zealand Deer Farmers’ Association formed.

1984: Game Industry Board formed as a statutory marketing board to represent the interests of the farmed deer industry.

1990s: Period of rapid growth in farmed deer numbers.

2002: Game Industry Board reformed into Deer Industry New Zealand with inclusion of venison and velvet marketing representation.

2000s: Decline in deer numbers from 2004.

2010s: Stabilisation of markets and return to growth

Deer farming today - value proposition

Modern deer farms must compete for land use profitability – the industry cannot survive on passion alone. Deer are a profitable farming enterprise on their own and add value and diversity to mixed-species operations. See Deer Farming (p17) for examples of how deer add value to farming systems.

Further information

A detailed history of the deer industry can be found at <https://teara.govt.nz/en/deer-and-deer-farming> and within some of the resources listed above. There are some great YouTube videos of the early deer cullers, wild venison export and live capture days.

2. Terminology & Abbreviations

Buck: Male fallow

Bull: Male wapiti or elk

Calf: Young wapiti or elk

Cervena®: Appellation for NZ farm-raised venison, produced to exacting standards

Cow: Female wapiti or elk

Crossbred: Offspring of breeding red deer with elk/wapiti

DEEResearch: Joint AgResearch/DINZ funding body for deer-related research

Deer Select: Programme for measurement of performance traits and development of published breeding values to help producers select sires with genetic traits that suit their breeding objectives

DINZ: Deer Industry New Zealand

Doe: Female fallow deer

Fawn: Young red or fallow

Hard antler: The antler after the outer soft skin has stripped and the antler has calcified

Hind: Female red deer

NVSB: National Velvetting Standards Body

NZDFA: New Zealand Deer Farmers' Association

P2P: Passion2Profit, a Primary Growth Partnership programme

R1: Young deer from weaning until 12 months of age

R2: Deer in their second year of life

Rut/roar: Breeding season

Spiker: Stag from one year old (or approaching one year) until about 18 months

Stag: Male red deer

Trophy: A stag that is destined to be hunted for its antlers; usually commercially bred and then released onto a hunting block

VARNZ: Velvet Antler Research New Zealand

Velvet: The entire velvet antler during the growing stage

Weaner: Young deer from weaning

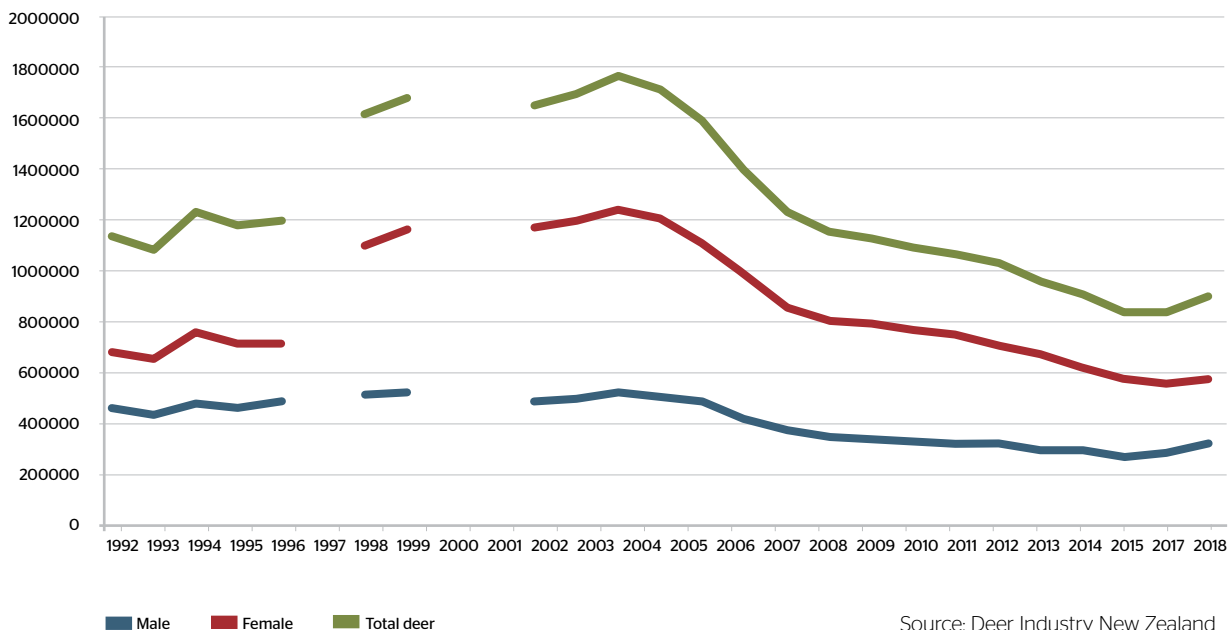
3. Deer Industry Statistics

Farmed deer numbers

Today, there is a feeling of positivity in the market and optimism for the sustainable future of the deer industry. This is captured through the number of farmers who intend to expand their deer farming operations. There is also a high uptake in industry initiatives such as Passion2Profit and recent marketing activities being well received. Like other emerging industries, the deer industry has experienced highs and lows. Graph 1 below shows a rapid increase in farmed deer numbers and an equally rapid decline. Many factors, including taxation regimes, market impacts and land use changes influenced these trends.

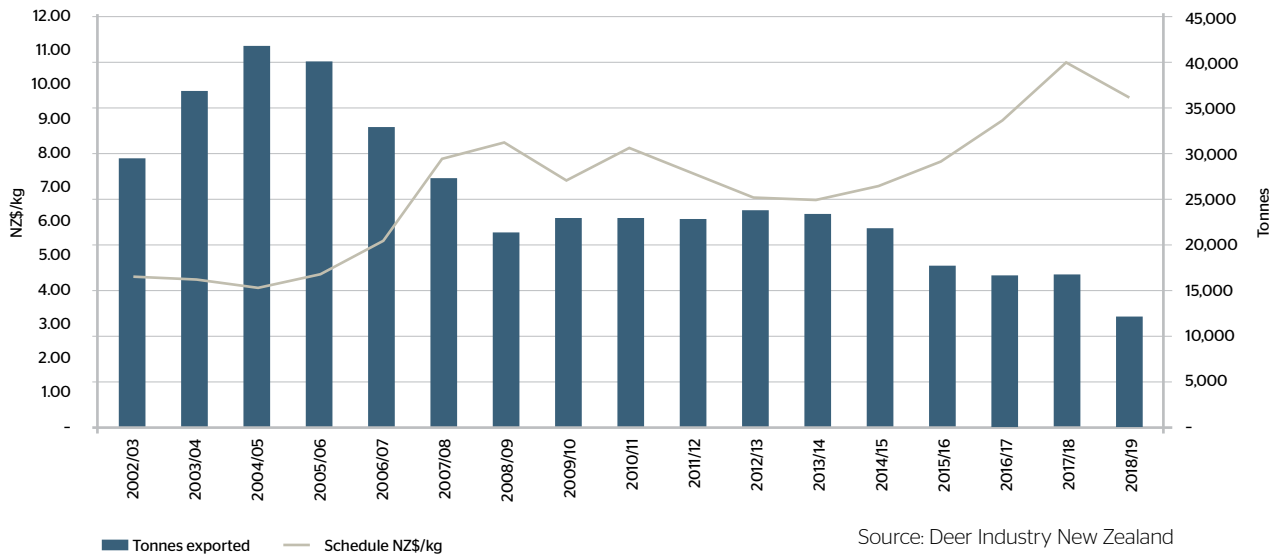
Recent activities have focused on farming deer well and developing stable, diversified markets to reduce volatility. The national deer herd is increasing. Stag and hind numbers have risen from a low in 2016.

Graph 1: Total farmed deer numbers



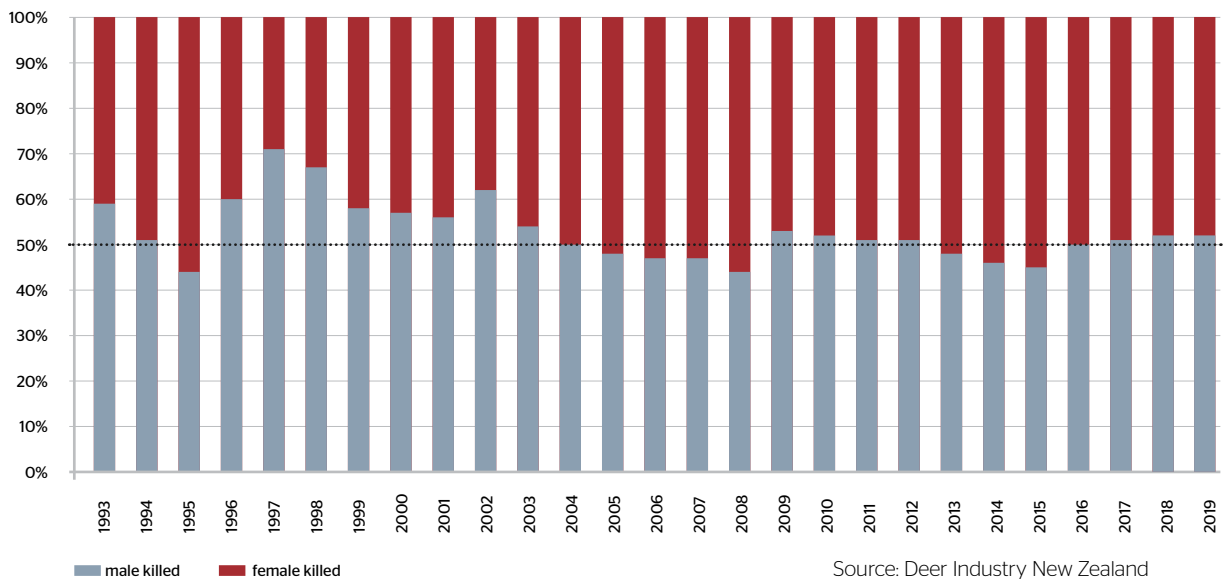
Graph 2 shows the relationship between total venison exports and farm-gate prices. As is often seen with unprofitably low returns, rapid loss of confidence in the industry perpetuates the problem of oversupply and ongoing low returns. This resulted in the rapid decline in deer numbers from 2005 to 2010. While a decline allows a more sustainable niche marketing approach, it restricts development of new markets and critical mass for driving the industry forward. Despite improving returns from about 2013, the national herd continued to decline gradually, but showed signs of recovery from 2017.

Graph 2: Volume of New Zealand venison exports and annual average venison farmgate price



The proportion of males versus females that are processed indicates farmer confidence and herd building. Graph 3 shows the proportion of hinds versus stags killed in each year from 1993 to 2019. It shows that, up until 2016, the breeding herd had been declining as more than 50% of the kill was hinds. This has partly been due to the high velvet returns and more male progeny being retained to build up velvet herd numbers. In 2019, the proportion of hinds killed dropped below 48%, indicating a herd rebuilding phase is underway.

Graph 3: Proportion of males vs females processed annually



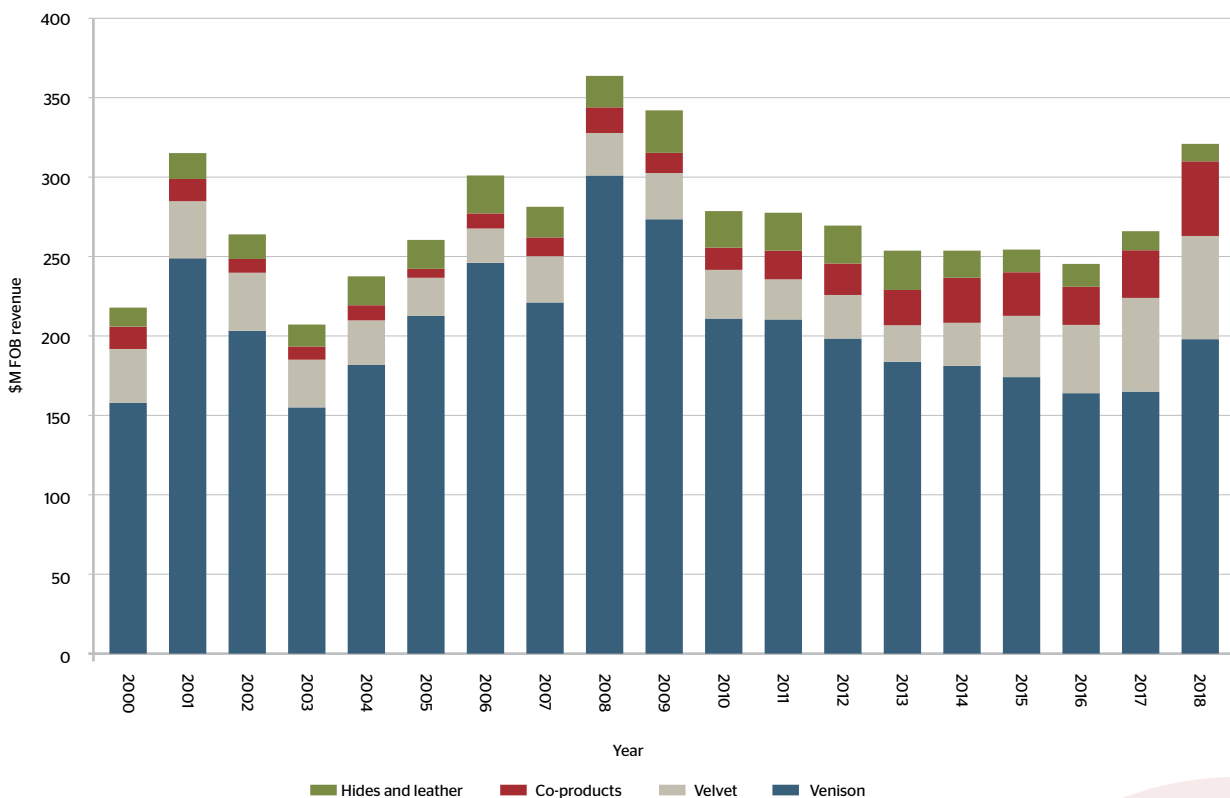
4. Deer Products

Export products include venison, velvet, skins, hides and co-products (e.g. sinews, tails, pizzles). Venison accounts for between 60% and 70% of these exports by value.

More than 95% of deer products are exported. Although the New Zealand deer industry is small compared with other export industries (just 2% of all meat and wool exports), it supplies about 50% of internationally traded venison. Changes in New Zealand venison production have a large impact on the international market price.

Graph 4 shows total FOB export value of deer products as venison, velvet, hides and co-products.

Graph 4: Industry Exports by Category



4.1 Venison

Venison is a lean and tender red meat that is naturally low in fat and high in protein, iron and zinc. It is suited to a range of cooking styles. Excellent recipes are available at: www.cervena.com

| Nutrients per 100g cooked portion | | | | | |
|--|--------------------|----------------------|------------------|------------------|--------------------------|
| | Protein (g) | Total fat (g) | Iron (mg) | Zinc (mg) | Saturated fat (g) |
| Skinless chicken breast | 22.3 | 2.1 | 0.5 | 0.9 | 0.7 |
| Pork loin steak - trimmed | 20.9 | 2.3 | 1.7 | 2.7 | 0.9 |
| Beef scotch fillet - trimmed | 22.5 | 8.3 | 2.0 | 5.8 | 3.0 |
| Lamb loin chop - trimmed | 20.7 | 6.8 | 1.7 | 3.9 | 2.9 |
| Venison leg medallion | 23.5 | 1.5 | 4.1 | 3.6 | 0.6 |

Source: NZ Food Composition tables - Plant and Food

Marketing

New Zealand venison is exported to about fifty countries. Germany was traditionally NZ's largest market but in 2017 was overtaken by the United States in terms of both value and volume. Belgium, the Netherlands, China, Sweden and Switzerland are among other important customers.

There are five main venison processing and exporting companies:

- Alliance Group
- Duncan NZ Ltd
- Firstlight Foods
- Mountain River Venison
- Silver Fern Farms

These marketing companies are working with DINZ in a marketing project as part of the Passion2Profit Primary Growth Partnership Project. The focus is on increasing sales of higher-valued chilled venison by moving reliance away from the traditional European game season and increasing demand for venison as a year-round healthy red meat option in selected markets.

New Zealand Venison in Europe

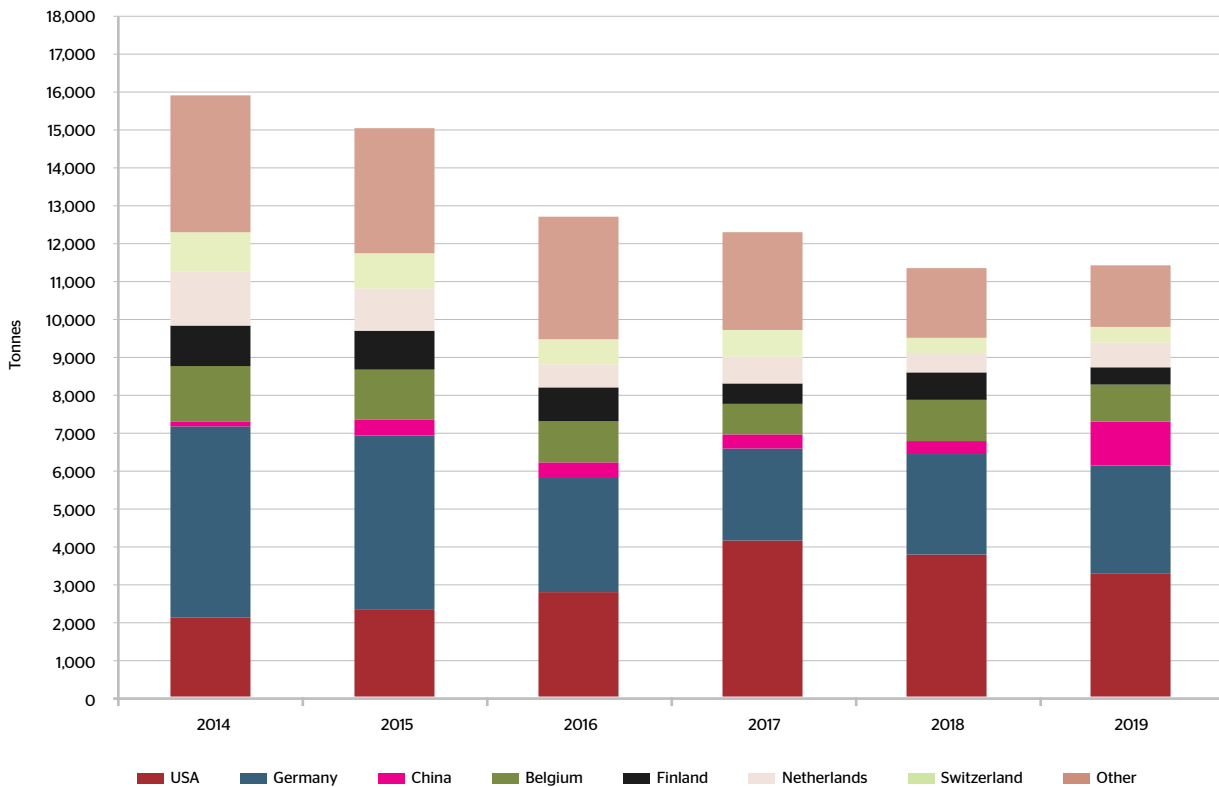
New Zealand venison is widely available in many European countries over much of the year. The main sales season is through the European autumn and winter. The majority of chilled venison exports are destined for this seasonal market, which results in the traditional chilled season premium in the venison schedule from September to November.

Most venison is sold through the restaurant sector during these cooler months, although many supermarket chains offer chilled and frozen venison alongside other seasonal specialties. Chilled New Zealand venison is increasingly sold to UK supermarkets under a variety of brands.

New Zealand venison in the USA

Most New Zealand venison in the USA is marketed under the Cervena® appellation. Cervena venison is distinguished from all other venison by a trademark assurance that the meat has been naturally raised and processed according to recognised quality standards.

Graph 5: Top 7 destinations for NZ venison, by volume



Source: Statistics New Zealand

4.2 Velvet

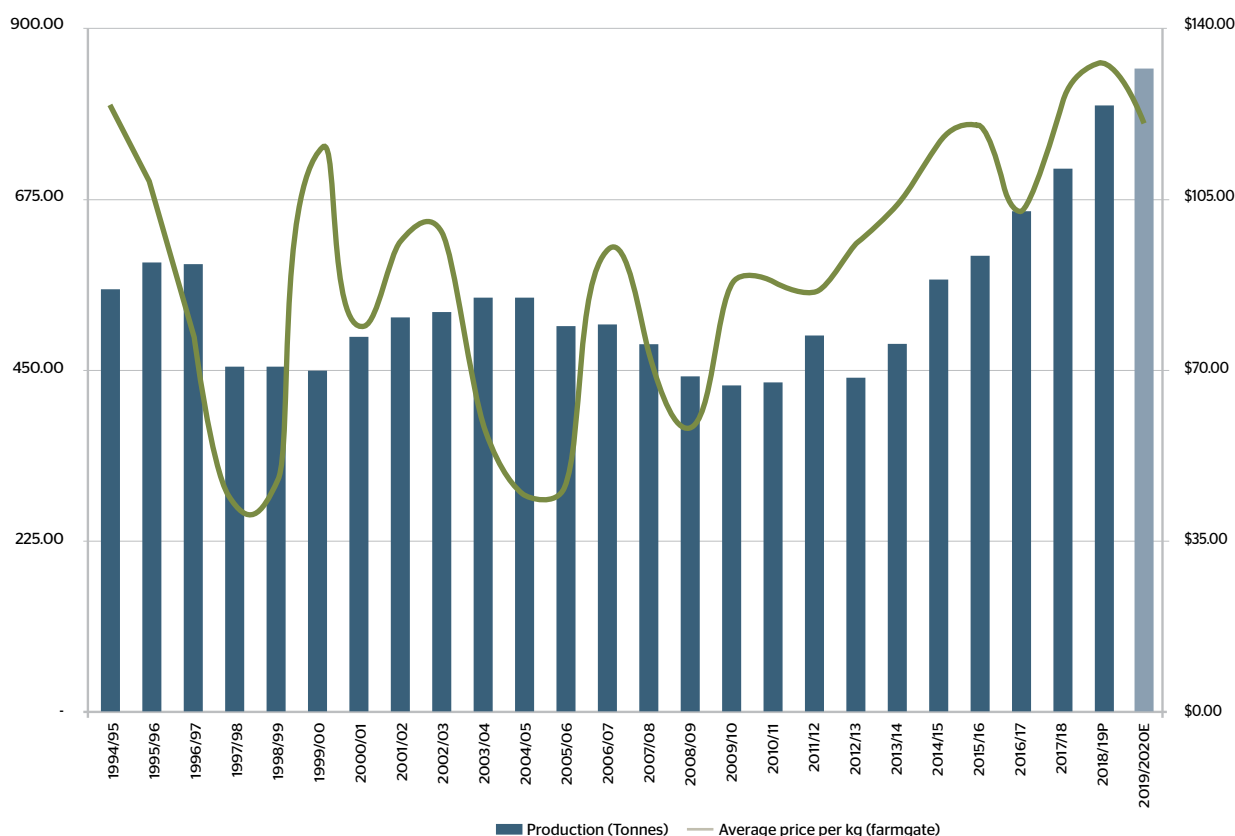
Velvet refers to the entire velvet antler that is removed at the base near the pedicle, the special structure that supports antlers. More details about velvet antler growth and harvest are included in the Welfare section on page 46.

Details on the processing and use of velvet antler can be found at www.velvet.org.nz

The majority of velvet antler goes into Traditional Chinese Medicines (TCMs) and functional foods. Some is incorporated into pet health products such as joint support and into sports supplements. Velvet capsules can be purchased in New Zealand.

Historically, the price of velvet has fluctuated, but has been stable-to-improving since about 2012. The long-term average is around \$100/kg. At that price, velvet production is quite profitable; at \$120+ it is a highly competitive land use option.

Graph 6: Velvet price and production



4.3 Hides and skins

Deer leather is recognised as a high-quality product. NZ farm-raised deer leather is sold to high-end leather goods manufacturers around the world, often being used by companies such as Prada and Gucci for their bags and other goods.

4.4 Co-products

Co-products are sometimes referred to as the 5th quarter and include tails, sinews and pizzles with some other minor products (e.g. blood, canine teeth) going to specific markets, most often for Asian medicinal uses. The value of co-products is included in the schedule payment to farmers, although not separated out. Co-products make a valuable contribution to the value of deer.

4.5 Trophy hunting

Breeding for trophy hunting is a small sector of the deer industry. Some specialist farmers invest heavily in genetics for trophy antler score. This, coupled with the high heritability of antler genetics has led to rapid increase in antler size and total length of antler. The market is limited and competitive with only those who have invested in producing the top trophy stags able to generate good returns from trophy stag production. It is a long-term venture as most trophy stags are not ready for the market until they are at least 5 years of age.

References

Statistics New Zealand

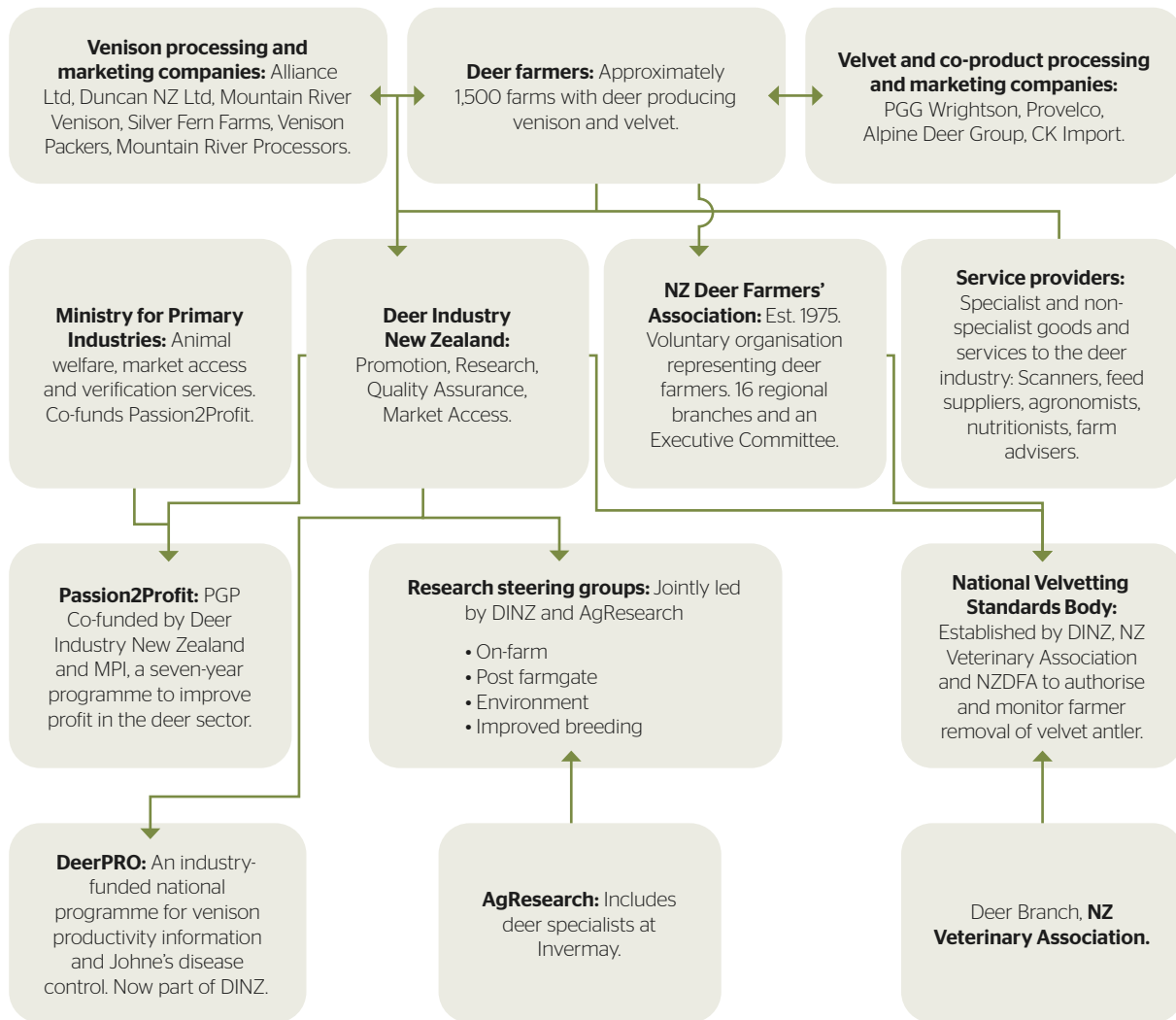
Ministry for Primary Industries

Deer Industry New Zealand Annual Reports

Notes:

5. Industry Structure Today

The diagram below provides an overview of some organisations involved in the deer industry.



The main bodies involved with servicing the needs of deer farmers are the New Zealand Deer Farmers' Association (NZDFA) and Deer Industry New Zealand (DINZ).

The NZDFA is a farmer-run organisation with branches around the country that organise events for local farmers. Each branch has a chairperson who attends national meetings and represents the deer farmers in their region. A membership fee goes towards running local and national events and covers costs of representatives. The NZDFA works closely with DINZ.

Deer Industry New Zealand is an industry-good organisation funded by deer farmers and venison processors and marketers. DINZ undertakes programmes on behalf of all industry stakeholders and is accountable to the entire industry. It does not buy or sell any deer products, but works closely with those that do.

5.1 Deer as a value proposition

Deer compete favourably with other livestock industries and are particularly valuable as part of a mixed-species operation. Deer are incorporated into many different operations including cropping, dairy, and sheep and beef.

Examples of gross margin analysis models are presented in separate handouts. While outcomes vary depending on market prices and individual farm performance, at a \$9.00/kg spring schedule and \$110/kg average price for velvet, breeding deer return around 10-20c/kgDM consumed, finishing deer 20-40c/kgDM and velvet 25-45c/kgDM, depending on production levels and intensity of management. It is useful to compare different operations on the same property, especially when the cost structure can be broken down between the different stock classes.

Incorporating deer is not just a matter of determining the best \$ return over a full season of feed intake. The cost of feeding, utilisation of natural pasture production and terrain on the particular farm type should also be taken into account.

For example, breeding hinds perform very well in extensive hill country where they can achieve excellent reproductive performance with minimal workload. Good nutrition is required from fawning to mating (November to March) with maintenance during winter on relatively low-quality feed. On the other hand, weaner deer can be finished where there is relatively good winter and spring growth and do not need to be carried over the summer. They can fit into a cropping and summer fallow or harvesting system. Fifteen-month weaner finishing can utilise late spring and summer feed to achieve good weight gains and have yearling deer off the property before their second winter.

Below are two examples of gross return (not including direct costs) to show how deer can be profitably integrated into other farming enterprises.

Example 1:

Incorporating intensive finishing deer into a seed, cropping and lamb operation, Canterbury plains, irrigated.

Weaners purchased on 1 May @ 60kg \$5/kgLW = \$300/hd

Finished on 1 November @ 55kg carcass weight \$9/kg = \$495/hd

Margin = \$195/hd

Feed consumed = Total ME 4894MJME (466kgDM*)

Gross Return 42c/kgDM; 21kgDM/kg meat grown

Other advantages - Seed crops sown in spring and harvested in late summer/autumn when deer are off the property. Allows winter crops to be used as part of the cycle.

* Feed consumption assumes ME of 10.5MJ/kgDM and no wastage.

Example 2:

Sheep, beef, deer selling all weaners store, South Island hill

Red hind 120kg, all terminal wapiti stags, purchase replacement hinds

Survival to sale: 90%, average fawning date 20 November, weaners sold 1 May @ 60kg, \$5/kg, replacement 20% @ average. \$150 margin over cull hinds to works. Stags 1:50

Gross income: \$270/hind

Less replacement costs of: \$80/hind

Net income: \$190/hind

Feed consumed for hind and fawn MJME = 12,254, or 1,167kgDM*

= 16.3c/kgDM; 38.9kgDM/kg meat off farm.

Other advantages - Having all young stock off before winter allows reduced winter feed costs, low labour, very low animal health costs and a focus on other classes of stock on winter crops.

*kgDM assumes no wastage and ME of 10.5

6. Deer Biology

6.1 Seasonality

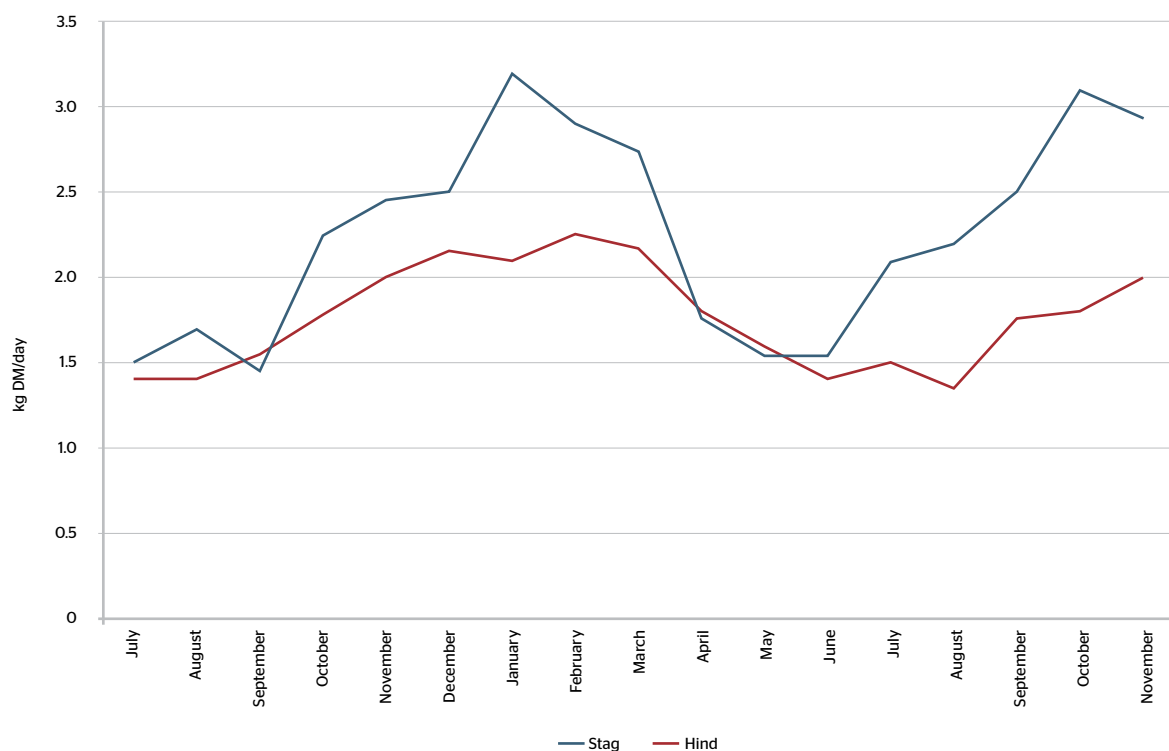
The seasonality of deer limits and dictates not only the breeding season but also what types of feeds are most suitable and when the most economic time is to provide high-quality feed. Seasonality may also alter disease susceptibility.

Understanding the seasonal requirements of different classes of deer helps determine whether a property is best suited to breeding, finishing or velvet stags and how these can be integrated with other classes of stock.

Red deer and Wapiti are strongly seasonal short-day breeders. Hinds cycle naturally from mid-March until June. Stags have a slightly longer reproductive season. This is covered in more detail in the Reproduction section on page 39.

As well as physiological feed requirements, seasonality also regulates voluntary feed intake (VFI) in deer. Graph 8 demonstrates the seasonal VFI of red deer. Wapiti and crossbred deer do not appear to have such a marked decrease in VFI during winter compared with straight red deer.

Graph 8: Voluntary feed intake - red deer



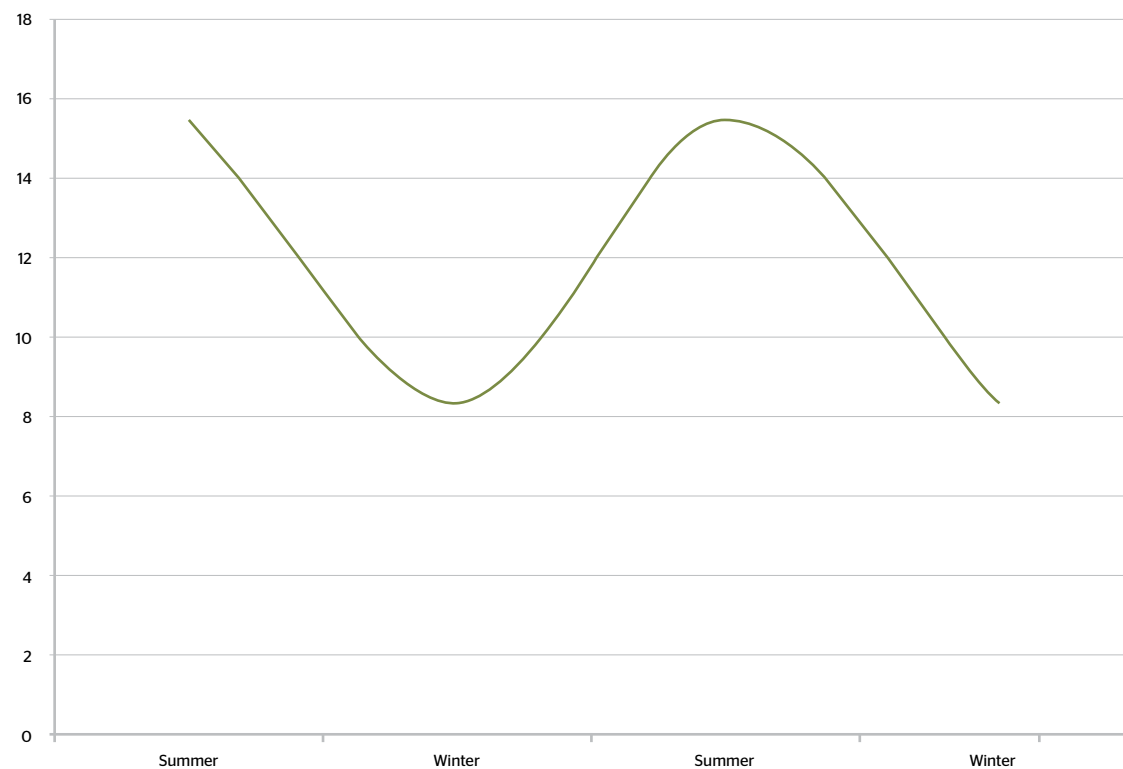


Activity:

On the diagram below, mark the following:

- Mating
- Calving
- Antler growth
- Antler casting
- Decreased VFI

Seasonal voluntary feed intake



6.2 Behaviour

Deer are gregarious, non-territorial, seasonal breeding animals. In the wild, they live in small single-sex groups outside the breeding season. For hinds these usually consist of matriarchal family groups with a clear hierarchical order. Stags may live in groups during antler growth, or be solitary, and separate during the rut. Hinds separate from the group to fawn or calve.

Deer behaviour in a farming situation

- Deer, particularly young deer, become distressed if isolated from other deer.
- Mixing of groups can cause temporary aggression in hinds as a new hierarchical order is established.
- Deer, particularly hinds and weaners, adapt well to being farmed in relatively large groups at high stocking rates.
- Stags can live in fairly large groups during velvet growth and are generally docile.
- Stags require plenty of space during the rut (March to May) and can become aggressive to the point of death if mixed with unfamiliar stags at that time. They are also extremely dangerous for humans during this time.
- Hinds require stable social groups and plenty of space during fawning.
- Some behaviours are warning signals of pending aggression or distress, e.g. lifting the nose, grinding teeth, tongue lolling, foaming at the mouth, pre-orbital gland flaring, raising hair (hackles) along the back, standing square front on, foot stamping and ears flattened back.

Flight response

Flight response varies greatly depending on the farm environment and the level of handling and supplementary feeding. Deer on extensive hill country that are infrequently mustered have a long flight distance. This can make them difficult to muster, particularly when there is ample contour and scrub to hide in. Deer may separate from the group during mustering.

On intensive farms exposed to frequent traffic and human contact, deer can become relatively oblivious to the presence of people. Where supplementary feeding is done regularly, deer approach people rather than run away when they hear the vehicle usually associated with the feed.

The genetic temperament of the deer has an impact on flight response. Some genetic lines are known to be more fearful than others. These animals are more likely to run into fences and damage themselves during mustering and yarding.

Good stock handling and mustering, clean, well thought-out laneways that flow well and gates located in such a way that they can be closed before deer have the opportunity to turn back are important for the effective management of deer.

In some cases, it is easier to leave gates open and let deer self-shift with the lure of better pastures or feed (e.g. maize). This is particularly useful for hinds with fawns at foot or newly weaned deer.

Good resources on fence and yard construction are available on:
www.deernz.org/deer-hub/handling-and-welfare/handling/fencing

7. Deer Farming

7.1 Infrastructure and handling

Deer handling facilities

Deer are not difficult to handle given the right facilities and staff trained to work with the animals to suit their particular behaviour. Many procedures can be performed with the animals loose in a small pen. For procedures requiring greater restraint, crushes or cradles have been designed.

Good deer handling can be a bit of an art. Taking it quietly and working in small areas with close constant contact from the side of the animal works best. Loud noises, voices, banging, sudden movements, changing in lighting, hitting with sticks and working in large pens with deer running around in circles increases stress levels in the animals and leads to difficult handling. Deer generally do not respond well to tight physical restraint. Where this is necessary, it is best to use a well-designed crush or cradle.

Fencing

Key considerations:

- Deer are hard on fences
- Post rubbing
- Attempts to escape
- Do the job right first time
- Electrics work well when used appropriately (outriggers, break fencing on crop)
- Antlers and fences don't mix
- Fence pacing is a significant cause of erosion and environmental concern
- Boundary fences must be 1900mm high and secure. All deer farms located in regulated areas of New Zealand, e.g. northern and upper-western North Island, require a permit or authorisation from the Department of Conservation (DOC) to farm deer.

Yards, sheds and pens

Excellent guidelines on good shed and yard construction are available on: www.deernz.org/deer-hub/handling-and-welfare/handling/shed-design

Tips on good deer shed design

- Consider animal flow; corners rather than dead ends; avoid things that might spook deer and cause them to turn back.
- Solid construction - solid or semi-solid walls (e.g. plywood)
- Size of pens - a range of sizes is good
- Race - a long, curved race divided with sliding gates is very useful. Side curtains facilitate entry into the race and reduce attempts to jump out.
- Don't leave deer on their own; they can become extremely distressed and damage themselves if isolated. Two at a time works a lot better than one at a time. Exception: stags in hard antler.
- Deer will attempt to go under or over walls, and through tight gaps.
- A central round-pen or octagon feeding into side pens is useful.
- For handling large stags, particularly trophy operations or wapiti bulls, it is useful to set the facilities up so that the operator never has to enter the pen with the animal. This should include feeding into the crush.
- Bi-fold doors are useful.
- The working area is best covered with a roof. Deer are more settled in covered yards. This reduces jumping and attempts to escape and generally results in more docile animals.
- Lighting should be adequate to see animals and equipment clearly. Darkened yards are not necessary.
- Floor surfaces should be designed to reduce dust and be non-slip. Foot injuries from unsuitable flooring can result in fatal infections. Rubber matting is a good option.

The table below lists procedures commonly performed on deer and the best restraint methods in each case.

| Procedure | Class of stock | Restraint method |
|-------------------------------|---------------------------------------|-------------------------------------|
| Tb testing | Hinds, stags | Race, crush or pen |
| Pregnancy testing | Hinds | Race preferred, small pen |
| Weigh | Weaners, hinds | Race, box, weigh crate |
| Body condition score | Hinds mainly, stags | Race or pen |
| Drench | Weaners, hinds, stags | Pen or race |
| Vaccination | Weaners | Pen or race |
| Velvet removal | Stag | Crush, chemical sedation |
| Hard antler or trophy scoring | Stag (aggressive when in hard antler) | Crush +/- chemical restraint |
| Semen collection | Stag | Crush or cradle, specially modified |
| AI | Hind | Crush with back access |
| Inspect and treat sick | Any | Variable |
| Surgery | Hind generally (e.g. ET) | General anaesthesia |

References

www.deernz.org/deer-hub/handling-and-welfare/handling/fencing

DoC information about regional fencing restriction:

www.doc.govt.nz/nature/pests-and-threats/animal-pests/deer/deer-farming-requirements-in-the-auckland-region/

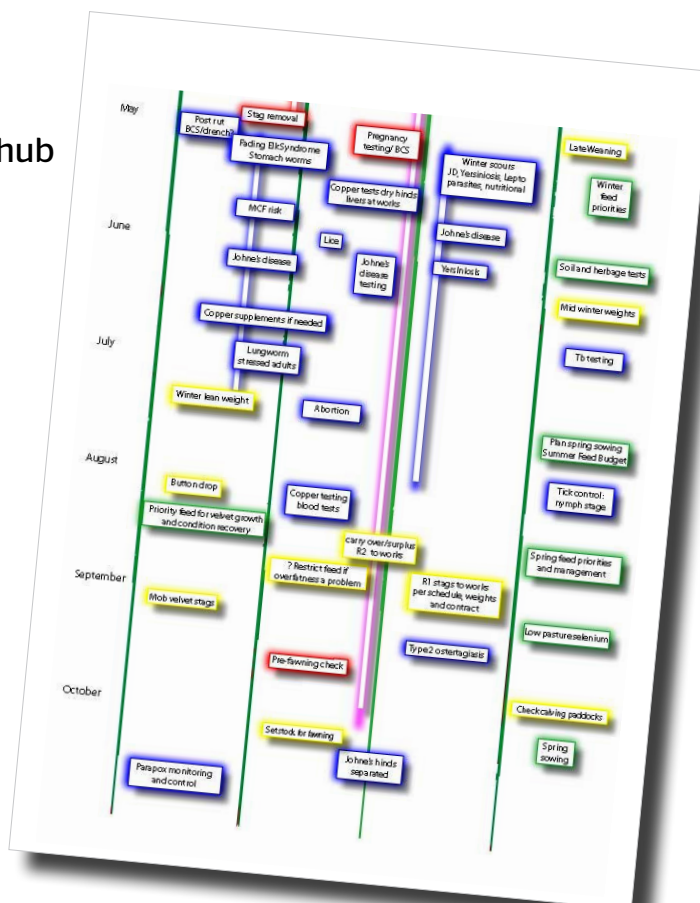
Deer Facts - Handling: www.deernz.org/deer-facts

7.2 Management

There is a full range of management intensities across deer farms.

The following diagram shows a detailed management and health interventions plan. Only a few of these management procedures are carried out on any individual farm.

Refer to www.deernz.org/deerhub for more management information.



7.3 Environmental management

Deer farmers are concerned with caring for the land on their properties. After all, deer farming was started by those involved with pest eradication from the bush. DINZ supports farmers developing environmental plans and working with local regional councils.

Deer have unique effects on the environment related to their behaviour and the type of country they are often run on, being largely hill country. Environmental management plans are individually tailored to suit each property and its inherent risks. Key points related to deer are listed below. The Deer Industry Environmental Code of Practice 2018 is a great resource.

Fenceline pacing and erosion

Pacing fencelines and digging under fencelines can be a significant cause of soil damage, erosion and sediment loss.

Methods such as fenceline placement, electric or other barriers along fencelines and soil stabilisation can be used.

Trees

Deer farmers are usually proactive in planting trees, but deer can be hard on trees through eating or rubbing on them. They generally require fencing into shelter belts or individual tree protectors.

Wallowing

Wallowing is a natural behaviour where deer bathe and roll around in mud. They create wallow sites in wet depressions in the ground, eventually forming quite large sites (2-3 metres across and up to 1 metre deep). It is not uncommon to see deer walking around caked in mud.

Waterways and crossing

Deer generally cross waterways quickly and contaminate them less than cattle do.

Nitrogen from urine

Some deer farms fall within catchments where nutrient budgeting and restricted allocations are in force. OVERSEER is used in these situations and can incorporate deer into the modelling. Matthew Carol and Rachael Mitchell of Perrin Ag have put together an excellent presentation on OVERSEER including a modelled farm that includes deer.

References

Deer Industry Environmental Code of Practice 2018:

www.deernz.org/deer-hub/farm-environment/environmental-management-code-practice

OVERSEER and deer farming video (Perrin Ag Limited)

Deer Facts: Fence Pacing, Protecting Waterways, Effective nutrient management on deer farms: www.deernz.org/deer-facts

Thought questions

- Consider the environmental impacts of deer in the wild and behind fences.
- How do new and changing environmental regulations affect deer farmers today?
- What resources or advice can be developed to help with these challenges?

8. Productivity

8.1 Venison production

Gross income is determined by: Number of fawns x growth rate x yield x price

Number of fawns: Reproduction efficiency (# fawns alive/# hinds mated)

Growth rate: Feed + genetics + health

Yield: Genetics + age + feed type

Price: Seasonal variation due to chilled premium - September to November. Age, grading

The general principle of efficiency is the same as any other finishing system - the faster the young animal is grown, the more efficient the conversion of feed to \$ as less feed goes into maintenance.

Fast growth rates may not be the best option on all properties. Low cost inputs and/or reduced stocking rates may suit some environments. Farmers must optimise inputs to achieve their goals; aiming for maximum production may not always be most sustainable.

Sustainability: Financial, environmental, markets, lifestyle

Goals: What are the primary goals and motivations of the farmer?

Efficiency: Within whichever system we are working, how can efficiencies be gained?

Notes:

Example of fast versus slow finishing gross return c/kgDM consumed, assuming 100% utilisation.

| | 12 months, fast growth | 22 months, slow growth |
|------------------------|-----------------------------------|-----------------------------------|
| Liveweight at purchase | 46 | 46 |
| Liveweight at sale | 96 | 117 |
| Carcass weight | 55 | 64 |
| c/kg gross schedule | 800 | 850 |
| \$/animal | \$443 | \$545 |
| Purchase price | \$300 | \$300 |
| Net return | \$143 | \$245 |
| Slaughter age | 12 months | 22 months |
| Total ME consumed | 6,378 | 14,154 |
| ME/kg meat | 115 | 221 |
| c return/MJME | 2.2 | 1.7 |
| c return/kgDM | 24 | 18 |

Notes:

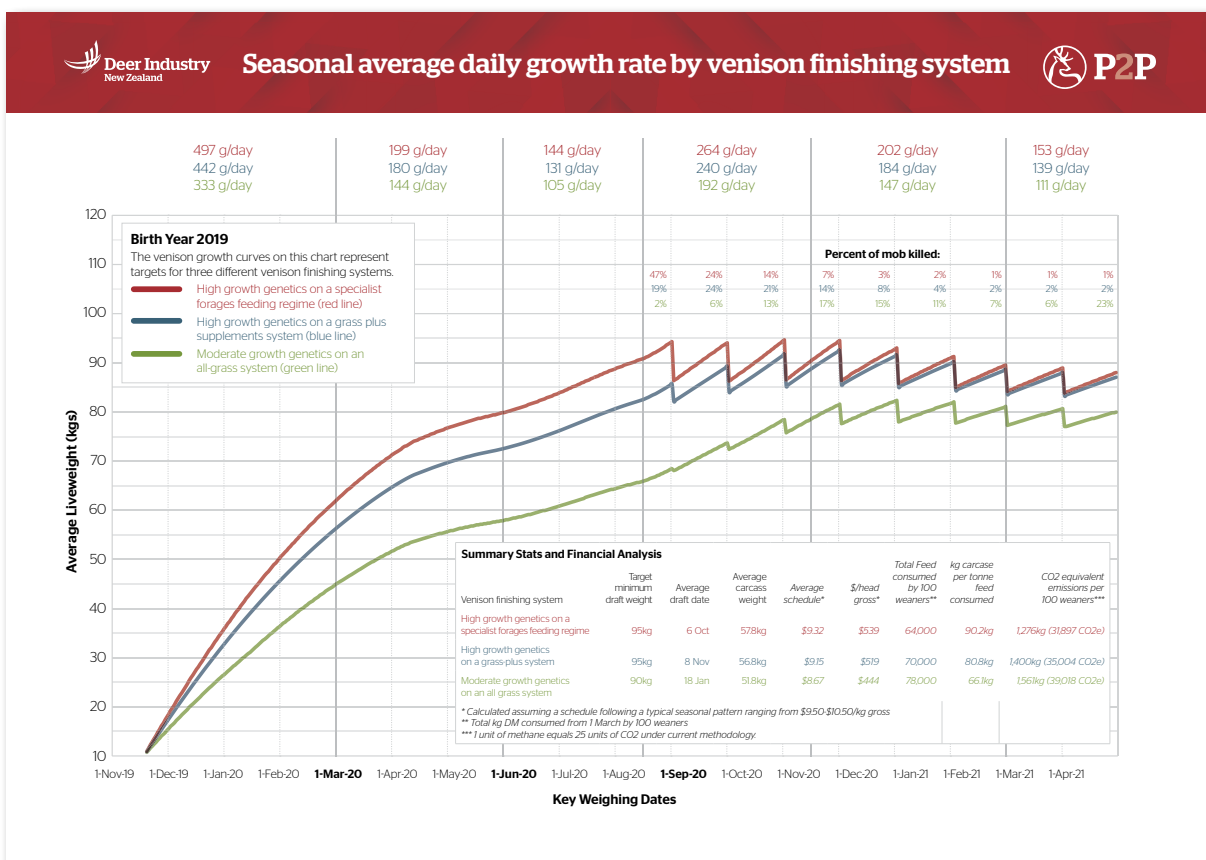
Target growth rates

Targets vary depending on the genotypes of the animals and the system being run. Females grow slower than males. Deer selected for velvet growth generally have slower growth rates than deer selected for venison production. Traditional red deer of Scottish origin have slower growth rates and may show greater seasonal variation than newer introductions of European origin.

The best option is for each farmer to set targets to suit their system and their animals and to try and improve over time. Seasonal differences from one year to the next mean that incremental gains may not be achievable every year. However, the aim should be to continually improve breeding, feeding and health so that over a number of years the average daily growth rate is improved without increasing costs disproportionately. A consideration on many farms is the size of the breeding hind. Hinds need to be able to maintain body condition and rear a fawn in the environment of the farm. Very large hinds have a higher energy requirement to rear a large fawn and higher liveweight requirements for mating as yearlings. These may not perform well in harder environments.

Growth rates (from birth to slaughter) and a range of other benchmarked production indices are available for each farm's young deer in a summary report covering the last five seasons from the industry-funded programme DeerPRO (info@deerpro.org.nz or 0800 456 453).

Here is a link to growth rate charts that farmers can download www.deernz.org/deer-hub/tools/feeding and use and also to a standard growth curve based on good performance (not absolute top) for early- and late-finishing mobs.



Seasonal growth rates alter due to photo-period and seasonality. They also vary at different times of the year to match the physiological state of the animal and quality of feed on offer.

For consistency, the seasonal growth rates are generally broken down into:

Summer: Lactation. Assumed birth date 20 November or 1 December* until weaning 1 March

Autumn: Weaning 1 March until 1 June

Winter: 1 June until 15 August (North Island) or 1 September (South Island)

Spring: 15 August/1 September to 1 November

While farmers are encouraged to weigh on or around these dates (1 June, 15 August/1 Sept, 1 November), calculations should be flexible and based on number of days between weights.

Thought questions

In a mixed-species operation, what factors determine priority feeding of finishing stock?

- Is it better to feed the fastest-growing animals to get them off sooner or the slower growing to prevent a late summer tail-end?
- Which classes are best able to capitalise on summer pasture?

Discuss the factors influencing venison production systems and their relative importance.

* As fawning is not observed on farms, the assumed birth date can be based on fetal aging at pregnancy testing, mating management and feeding and historical observations of when fawns are seen "up and running with the hinds".

References

Growth chart for venison poster

Growth rate calculator www.deernz.org/deer-growth-curves

DeerPRO info@deerpro.org.nz or 0800 456 453

Resources

Deer Fact – Deer Feeding Tables: www.deernz.org/deer-facts

Deer App: <https://apps.deernz.org.nz/VenisonGrowthCurves/>

8.2 Velvet

Gross income = number of stags x (antler weight (first cut + regrowth) - damage and downgrades) x price

Antler weight = genetics + feeding + health

Grade = genetics + feeding + handling + timing of cutting

Style, downgrades = genetics, management, handling

Target velvet weights are changing all the time and relevant to individual farms rather than industry averages. As with venison production, improvement over time may be more important than the actual weights at a given time. Farms have different genetics, stocking, feeding and environmental conditions so comparing individual velvet weights between farms has limited value.

Velvet is highly heritable and therefore it is easy to make genetic gain simply by selecting the progeny of high-performing stags and selecting individual stags based on their two-year-old velvet weight as replacement stock. For this reason, velvet breeders have been able to make rapid progress, increasing average velvet weights 2- or 3-fold over time. As velvet is a valuable commodity and is relatively independent of the size of the stag, a doubling of velvet production per animal costs only a little extra in maintenance feed for the stag throughout the year while all other costs are the same, meaning a near doubling of profit. This could allow a reduction in stocking rate if desired, or even an increase in stocking rate as there is a greater financial return on supplementary feeding.

Velvet antler growth is controlled by testosterone and the entire antler growth cycle is repeated every year. Old antler is cast in the late winter or early spring and new antlers start growing immediately. Thus harvesting velvet antler before it hardens into bone is simply removing the antler before it would naturally fall off itself. Removal of antlers before they harden also greatly increases the safety of other animals and people working with the deer.

Velvet removal is discussed briefly in section 12.2. Further details on velvet growth can be found at: www.deernz.org/deerhub/deer-information/antlers

Metabolisable energy requirements of different classes of deer for different physiological states - various information sources.

| | Deer | Sheep | Beef Cattle |
|--|---|--|---|
| Maintenance adult female | 0.62 MJME / kgLW ^{0.75} | 0.45 MJME / kgLW ^{0.75} | 0.55 MJME / kgLW ^{0.75} |
| Maintenance adult male | 0.72 MJME / kgLW ^{0.75} | | |
| Liveweight gain adult | 55MJME / kg gain | 55 MJME / kg gain | 70 MJME / kg gain during lactation. |
| Liveweight loss contribution to ME req | 25MJME / kg loss | 17 MJME / kg loss | 28 MJME / kg loss |
| Maintenance young female | 0.68 MJME / kgLW ^{0.75} | | 0.58 MJME / kgLW ^{0.75} |
| Maintenance young male | 0.78 MJME / kgLW ^{0.75} | 0.51 MJME / kgLW ^{0.75} | 0.52 MJME / kgLW ^{0.75} |
| Growth young male | 37.8 MJME / kg LWG | 35 MJME / kg LWG | 35-40 MJME / kg LWG |
| Growth young female | 46.2 MJME / kg LWG | 45 MJ ME / kg LWG | 40-45 MJME / kg LWG |
| Lactation | 22 to 50MJME / day depending on weaning weight and stage of lactation | 11 to 26 MJME depending on weight, single or twin and stage of lactation | 75 to 100 MJME / day depending on weight of cow and stage of lactation. |
| Pregnancy | 55MJME / kg birth weight | 45-50 ME / kg birth weight | |

Protein requirements

Metabolisable protein (MP) requirements for maintenance of adult deer

| | Liveweight kg | | | | | |
|--------------|-------------------|-----|-----|-----|-----|-----|
| | 100 | 120 | 140 | 200 | 300 | 400 |
| | gMP/hd/day | | | | | |
| Hinds | 70 | 80 | 95 | | | |
| Stags | | | | 120 | 170 | 220 |

Based on easy hill diet of 10.5MJME/kg DM
 Add 6% for hard hill, subtract 3% for flat
 Add 13% per MJ ME below 10.5 MJME/kg DM
 Subtract 7% per MJME above 10.5MJME/kg DM

Metabolisable protein (MP) requirements for maintenance of young deer

| | Liveweight kg | | | | | |
|--------------|-------------------|----|----|-----|-----|--|
| | 40 | 60 | 80 | 100 | 120 | |
| | gMP/hd/day | | | | | |
| Hinds | 35 | 45 | 60 | 75 | | |
| Stags | 37 | 50 | 65 | 80 | 90 | |

Based on easy hill diet of 10.5MJME/kg DM
 Add 6% for hard hill, subtract 3% for flat
 Add 13% per MJ ME below 10.5 MJME/kg DM
 Subtract 7% per MJME above 10.5MJME/kg DM

Source for above tables: *Pasture and Supplements from Grazing Animals*. Eds PV Rattray, IM Brookes and AM Nicol. New Zealand Society of Animal Production, Occasional publication No 14, 2007. Chapter 10.

Protein requirements for weight gain

Adult deer: 400g MP/kg LWG

Weight loss: Provides 300g MP/kg LWL

Young deer: Varies depending on genotype and liveweight but is around 300g/kg LWG.

Pregnancy: Approx. 3.2kg MP/kg fawn

Lactation: Approx. 200g/day (120-240) depending on stage of lactation and weaning weight

This works out very approximately to crude protein (% of DM) of:

Hind and stag maintenance: 6-8%

Hind during lactation: 15-18%

Weaner maintenance: 10-12%

Weaner growth: 15-18%

Velvet growth: 18% (Very limited data, a target of 18% protein is considered appropriate)

There is considerable variation in crude protein requirements depending on total feed intake and rate of rumen protein degradation.

While this is an interesting comparison and essential for feed budgeting, from a practical point of view, the amount of feed offered and the quality and palatability of that feed are much more important factors determining animal performance.

The P2P project has developed some excellent tools for calculating feed allocation for deer. These complement Q-graze for deer which focuses on pasture height and quality.

Resources

Deer Fact - Deer Feeding Tables: www.deernz.org/deer-facts

Deer App: <https://apps.deernz.org.nz/VenisonGrowthCurves/>

Deer feeding concepts

- Palatability has a big influence on feed intake.
- Seasonality has a major effect on feed intake (as discussed earlier).
- Red deer have a higher rumen outflow rate than other species, which may help explain why they don't get bloat. It is safe to graze deer on clover-dominant pastures all year round.
- Rumen outflow is higher in winter than summer despite lower VFI during winter.
- Rumen size decreases during winter.
- Deer are much less susceptible to metabolic issues than cattle. For example they can rapidly transition onto fodder beet quite safely. Acidosis is uncommon on crops. Milk fever is not reported.
- A huge variety of supplementary feeds can be fed to deer and they do quite well on most of them.
- Young deer can be slow to take to a new feed and it is best to introduce supplements while they are still with their mothers.
- Rumen acidosis can occur when feeding maize or deer nuts.
- Weaner growth rate response to specialty forage such as legumes and herbs is greatest in autumn.
- Pasture should be rotationally grazed to a residual of 8-10cm as for cattle rather than 4-6cm as for sheep. This is true for ryegrass-based pastures but red clover can be grazed to lower residuals while still achieving higher animal growth rates.
- Feeding hinds during lactation: Feed requirement doubles during December, January and February when pasture quality is often lacking.
- Fawn growth rate responds strongly to pasture quality and allowance.
- Mature stags undergo massive seasonal variation in feed intake and body weight changes.
- Deer are better able to cope with high condensed tannin diets.
- Deer grazing chicory have higher copper, Vitamin B12 and selenium levels than deer grazing pasture or plantain.

When working with deer farmers, get away from a focus on ryegrass-based systems that are purely driven by pasture height and daily allowances.

Feed preferences and VFI

Higher Preference

Red clover
Birdsfoot trefoil
Trefoil chicory
White clover
Lucerne
Sulla, sanfoin and other legumes
Legumes

Low preference

Mature ryegrass
High endophyte ryegrass
Yorkshire fog/browntop type pastures
Some types of browse

9.2 Summer

9.2.1 Hinds and fawns

Hinds and fawns should be the priority stock class at this time of year as inputs in summer almost certainly result in production gains.

It is difficult to achieve fawn growth rates greater than 400g/day on ryegrass-based pastures.

Requires:

Green leafy area >60%

ME>10.5

Legume >15%

Residual >2,500kg DM/ha

Higher growth rates can be achieved on red clover (even taken to residuals of 950kgDM/ha) and *Lotus* sp. Chicory achieves weight gains higher than ryegrass but less than lotus or red clover.

On farms where high-quality forage is not achievable during January and February, there is a positive and financially beneficial response to grain feeding. A relatively small amount of grain can produce significant improvements in weaning weight and hind body condition score at weaning.

Summer brassica crops can improve fawn weaning weights and hind body condition scores at weaning.

9.2.2 Stags

Stags require little attention during summer. By this stage they have gained a lot of weight and done most of their antler growing. The primary objective is to have them in very good but not over-fat condition before going into the rut. As they require only maintenance and have a natural tendency to put on weight during summer, they do not require any priority feeding.

9.2.3 Rising two-year-old deer

Yearling hinds require good quality feed as they are reaching puberty. Puberty is strongly influenced by bodyweight and they should be at least 85% of mature bodyweight before going to the stags. If quality is lacking at this time, a little maize can be added. Alternatively, if higher quality forages are available, it may be beneficial to offer these to yearling hinds.

Yearling stags can be treated with some flexibility at this time of the year. They are growing and naturally inclined to eat and put on weight; however their growth rate can be altered to allow for other priority classes of stock. It is critical that rising two-year-old breeding hinds do not lose weight at this time of year. If they are destined for slaughter, a faster growth rate allows them to be taken out of the feed demand side of the equation earlier, freeing up pasture for other classes of stock. If they are destined for velvet, a moderate growth rate and body condition should be maintained.

9.3 Autumn

Feeding priority during autumn depends largely on whether fawns have been weaned or not. Weaned fawns should take priority.

Weaned fawns

If on a ryegrass/clover based diet this should be:

Green leaf >90%

ME > 11.5MJME/kgDM

Clover >30%

Residual pasture length >1,600kgDM/ha

Relative to perennial ryegrass/white clover, research has found increases in growth rates on the following pastures:

Chicory + 47%

Red clover + 26%

Sulla + 41%

Plantain + 16%

Data taken from a meta-analysis done by Hoskin and Griffiths (2007) In *Pasture and Supplements for Grazing Animals* 14.

Hinds

Weaned hind requirements depend a little on their body condition at weaning. Light hinds should be gaining weight going to the stag. Those with a BCS of 3 or greater should be on maintenance. This is achieved relatively easily in weaned hinds at this time of the year. If hinds are not weaned before mating they should take priority. The demand of lactation delays conception if it is not fully met with a high-quality diet. Early weaning results in a conception date 7 to 14 days earlier compared with hinds that are not weaned before mating.

Stags

Stags used for mating lose a lot of weight during the roar. Managing to suit their behaviour is more important than feeding, but to minimise the inevitable weight loss, stags benefit from high-quality feed to make up for the lack in feed volume.

Velvet stags require space to rut and rub their antlers. They are aggressive at this time and attention should be paid to their social groupings. A little high-energy, highly palatable feed at this time can help reduce weight loss and settle the stags. For example, when velvet stags were offered 4kg/day of lifted fodder beet in the paddock there was little wastage and the stags were more settled, coming out of the rut in better condition than in previous years.

Once stags settle and start to take more interest in feed, high-quality feed should be offered and high pasture covers if available to capture the small window of opportunity to put weight back on before winter.

9.4 Winter

There is little benefit in adding high-cost or high-quality supplements in winter. Not only is the VFI decreased in all classes of deer, but offering expensive grain supplements may result in substitution of feed, rather than improved production. Wapiti and crossbred deer may have a lower seasonal reduction in feed intake and therefore a better response to winter feeding compared with straight red deer. Red deer that have been selected for high growth rates may respond better to winter feeding than smaller “English type” red deer.

There appears to be a trade-off between winter and spring growth in deer. Fast winter growth is followed by slower spring growth rates and vice versa.

This lends weight to avoiding high-cost supplements in winter while attempting to capture full spring growth potential.

Weaners

Weaners can maintain growth rates of 100g/day in red deer and 150g/day or greater in crossbred stags provided they are offered enough palatable feed.

Good growth rates can be achieved on:

- High-quality brassica crops with baleage
- Fodder beet with baleage
- Annual ryegrass

Very poor or static growth rates during winter are seen on low covers of perennial ryegrass-based pastures.

Hinds

Hinds should be on maintenance during winter. They adapt very well to feedpad situations, particularly if they have access to trees. This makes sense given their original environment and the harsh winters they are adapted to.

A common and successful method for wintering hinds is a self-feed silage stack in an area with good shelter, sunlight and drainage.

Hinds should not lose weight during winter as this delays fawning and makes them more susceptible to other conditions such as parasitism, Johne's disease, MCF and trace element deficiencies. It can also potentially reduce their lactation ability.

Hinds can winter well on crops with baleage or silage.

Stags

Stags should also be on maintenance with the allowance high enough for a little weight gain. Stags coming into winter in poor body condition need extra care into and during winter. This may include animal health treatments, some high-ME supplements in early winter and ensuring there is adequate shelter from severe weather in their paddocks. Stags are best wintered on a crop or with baleage or silage fed out rather than on a smaller feed pad area with a self-feed silage stack. Stags are less tolerant than hinds to being kept at high stocking rates at this time of the year.

Considerable wastage can occur on winter crops. This is best minimised by strip grazing if possible, allowing run-off pasture and/or baleage or silage and planting crops in suitable paddocks that will not get too boggy. Stags with antlers should not be grazed behind electric wires.

Good success has been achieved feeding lifted fodder beet and other vegetable waste to stags during winter.

9.5 Spring

Early spring is a time of critical feed deficit on many farms. As daylight hours increase in August, deer start to increase their natural desire to eat and grow. This includes both youngstock and stags. A primary focus of many farms is how to fill this early spring feed gap (see below).

Weaners/R1 deer

At this time of year, a strategic decision might be made around priority feeding of R1 deer to make the most of the limited feed in early spring and abundant feed later on.

One strategy is to priority feed the heaviest venison stags so they can be sent to the works early and on a high price schedule, thus freeing up space for the remaining animals. The risk of this strategy is a longer tail in slaughter dates over summer.

Farmers have trialled delayed killing of yearling deer to utilise cheap high-quality spring feed. Although this might mean missing the peak price schedule, high

growth rates over this time can make it a profitable way to utilise the feed and help maintain pasture quality.

Young deer are naturally driven to eat and grow. Their digestive systems are well developed by this stage and spring pasture is usually of relatively high quality. This means there is marginal benefit in using specialist feeds for weaner growth. This assumes an ME of at least 11.5MJME/kgDM in spring pasture.

Compared with ryegrass/white clover, increases in spring growth rates of 19% on chicory and 14% on red clover have been found.

Hinds

There is not generally any problem with feeding hinds at this time of the year. They should be maintained at a body condition score of between 3 and 4 before calving. Overfatness in late spring can be a problem on some farms and increase the rate of dystocia (fawning difficulties). Feeding in spring should be directed by body condition score.

This is a good time to spell and freshen hind fawning paddocks or pregraze with sheep or cattle if pasture is likely to get too long and lose quality in early summer.

Newly bought-in hinds or yearling hinds that are unfamiliar with the paddocks should be set stocked at least two weeks (preferably much longer) before fawning. Older hinds familiar with the fawning paddocks should be set stocked at least one week before fawning.

Stags

Stags cast the “button” from the previous season’s antler from mid-August and then immediately start to grow their new antlers. At the same time, stags start to rapidly gain weight in response to increasing day-length and an almost total lack of testosterone.

Antler growth is sensitive to feed or trace element deficits, systemic disease and lameness. As this is the primary product of the velvet stag, it is sensible to take great care to ensure maximum growth at this time of year.

Velvet stags also benefit from early spring feeding. A positive cost-benefit return in velvet antler growth is achieved by feeding concentrates if pasture is lacking. However, on high-quality pasture (ME>11.5) with good pasture covers (>1,500kgDM residual) and good mix of grasses, clovers and herbs, it is unlikely that additional concentrates will result in an economic production response. Substitution can allow for increased stocking rates or pasture allocation to other classes of stock.

9.6 Feed planning

Every farm is different, so forage planning is very individualised.

Climatic conditions seem to be changing and less predictable with increasing drought in some areas and increasing wet in others or alternating between these extremes in the same area. Good growing conditions interspersed with poor are often experienced.

These changing conditions continually challenge farmers to better manage their feed. The key is to get the right balance of forage types to suit the season, different classes of stock and pasture renewal programme for the property.

Deer farmers use and consider a wide range of options to suit their farms and stock.

The P2P feeding group has developed a forage planning tool for deer farmers.

Feeding to meet the needs of deer

Perennial ryegrass/white clover-based pastures or mixed swards that are of high quality and adequate length during spring meet the needs of growing R1 deer, velvet stags and hinds. There is no need for additional inputs in that case. However, these pastures do not always fit well with deer production systems at other times of the year. The following can be used to meet the needs of deer:

- More palatable and higher-quality feed for autumn growth in weaners, e.g. chicory, plantain, red clover, lucerne.
- Earlier production in spring to capture potential stock production from August, e.g. fescue.
- Deferred grazing by using a crop to spell pastures.
- Lower cost, but palatable feed during winter given the limited response to high-cost inputs, e.g. fodder beet (high yield), annual ryegrass, cereal grasses, brassica crops, silage.
- High energy inputs during lactation to maximise fawn growth and hind performance, e.g. lucerne, irrigation, grains.
- High energy inputs into stags during August and September to maximise antler growth if spring pasture is lacking, e.g. maize, deer nuts.

Feeds that meet the farm conditions

- Drought-tolerant species, e.g. fescue, cocksfoot, lucerne, subterranean clover, arrowleaf clover, red clover, chicory, plantain, greenfeed maize where suitable; irrigation where feasible
- Grass grub tolerance, e.g. fescue.
- Regrassing/cropping with minimal soil disturbance: direct drilling; spray and pray
- Crops as part of a regrassing programme and to even out the supply/demand curve
- Ryecorn as part of a regrassing programme in low summer rainfall areas.
- Greater use of mixed swards including legumes, grasses and herbs. In some cases the dominant legume in a mixed sward is lucerne.

Farmers use different grazing management and pasture control strategies to maintain pasture production and gain full potential. Cattle and sheep are often integrated into deer-fenced areas for this purpose.

References

Semialdi G, Barry TN, Muir PD and Hodgson J. (1995) Dietary preferences of sambar (*Cervus unicolor*) and red deer (*Cervus elaphus*) offered browse, forage legume and grass species. *The Journal of Agricultural Science* Cambridge. **125 (1)**, 99-107

Pasture and Supplements from Grazing Animals. Eds PV Rattray, IM Brookes and AM Nicol. New Zealand Society of Animal Production, Occasional publication No 14, 2007. Chapter 10.

A selection of scientific articles can be found at:

R&P Nutrition and Management of deer on grazing systems
(Symposium proceedings 2002) New Zealand Grasslands Association
www.grassland.org.nz/viewpublication.php?pubID=324

Pasture Quality and Q-graze for deer, DEEResearch, AgResearch publication 2005.

10. Reproduction

Deer are naturally very fertile. The conception rate to first service has been measured at over 90% and conception rates to a single timed artificial insemination are frequently over 80%. Reproduction under-performance is a common limitation on deer farms, however. The financial impacts of this are compounded by the fact that deer generally have only a single fawn or calf. Twinning is rare, possibly about 1/500 overall.

A primary concern when breeding deer is their strong seasonality. The natural time for deer to give birth is November to January, so hinds are lactating when pasture quality can be lacking in many regions. This pattern can suit other areas well. Early fawning (or at least eliminating late-born fawns) is a common goal.

Other areas of reproductive loss

Common:

- poor fawn survival
- failure of conception in yearling hinds
- stag failure
- social problems

Less common:

- abortion
- dystocia
- failure of conception in adult hinds (unless a stag failure)

Target reproduction performance

Each farm has its own targets, but the following are considered good.

| | Pregnancy rate* | Weaning rate** |
|----------------|-----------------|----------------|
| MA hinds | 97%+ | 95%+ |
| Yearling hinds | 95%+ | 90%+ |

*Pregnancy rate: percentage of all MA hinds joined with stag and proven pregnant by rectal ultrasound scan in first trimester

**Weaning rate: Fawns weaned divided by hinds joined +/- pregnant hinds bought or sold

The quirks of deer reproduction – a summary:

- Highly seasonal breeders, do not breed before about 10 March regardless of stag introduction or feeding (fawning no earlier than about 1 November).
- Yearling hinds breed about two weeks later than adult hinds
- To achieve 95% conception across the herd, yearling hinds need to be at least 85% of their mature weight
- Fawn survival is best on hill country with lots of space and minimal intervention
- Mating is rarely or never seen and hinds are difficult to consistently observe for oestrus
- Stags are naturally virile and can breed well over 100 hinds; however about 1:50 is more common.
- Stags are infertile during late winter, spring and summer. Semen testing usually shows abnormalities if done out of season.
- Hinds respond to weaning by coming into oestrus up to two weeks earlier than unweaned hinds. However, weaning rarely affects conception rate provided mating continues until late April.
- Mature hinds should have a BCS of 3 or greater at mating to achieve a 95%+ conception rate
- There is no obvious flushing effect in adult hinds (other than weaning and feeding well to advance conception date). Hinds generally have singles; feeding does not induce twinning.
- The most common problems in stags are social.
- Social problems are common in hinds as well.
- Stags expend huge energy during the roar/rut/breeding season. They lose up to 30% of body weight and need to be well looked after.

At fawning

Hinds are set-stocked for fawning and generally not interfered with for at least two months. This poses challenges for pasture management and means observation of hinds and fawns during fawning is limited. Fawns “hide” between feeds in their first week, making it impossible to shift hinds and fawns until after the last fawn is “up and following” its mother. In most cases, this is in the last week of December or first week of January.

Losses between birth and weaning are a source of significant wastage for the deer industry. These can be around 5-10% for mature hinds and much higher for yearling hinds.

Causes of loss are difficult to investigate and it is hard to know whether losses occur during pregnancy, during birth or after birth. Fawn survival is generally higher on extensive hill country where there are large paddocks with low stocking density and plenty of contour and cover in the form of scrub.

Causes of fawn death from birth to weaning

Mismothering

- disturbance
- bullying
- stress
- lack of safe hiding places
- intervention

Assisted fawning

- Hinds that have had an assisted fawning often reject their fawn and may even beat it to death.

Fawn running away

- moving through fences
- lack of safe hiding places

Killed by hind

- stress
- overly aggressive hind in mob
- stocking rate too high

Disease

- copper deficiency
- ticks
- possibly selenium or iodine deficiency

Causes of problems at mating

- hind condition - if average BCS is less than 3, conception rate is lower
- poor pasture quality at mating
- hind age structure too old
- stag infertility
- stag too shy (a classic case is a wapiti stag intimidated by a red stag roaring nearby)
- wrong number of stags in multi-sire mating groups - at least 3 is recommended.
- mixing mobs before mating
- yearling hinds not up to weight to reach puberty
- poor socialisation of yearling hinds with stags
- moving hinds onto a new property immediately before mating

Problems during pregnancy

- losses of up to 17% have been recorded in yearling hinds
- relatively uncommon
- no conclusive evidence of any specific disease.

11. Genetic Improvement

Deer Select is the industry-wide service for recording and ranking breeding values compared with a national benchmark. Genetic improvement was somewhat fragmented during the early years of the deer industry but Deer Select, with cross-herd sire referencing and progeny testing, has brought much greater cohesion and consistency.

Improvement in velvet genetics has been carried out on individual studs with no cross-farm referencing. Velvet and trophy antler has seen rapid improvement due to the very high heritability of both antler weight and conformation. This means that progress can be made without progeny testing and a very good stag has a high probability of passing on top antler genetics to both his male and female progeny. Deer Select now also records velvet BVs.

Recently the deer industry supported the Deer Progeny Test, which involved progeny testing with linked sires across a number of farms and looking at a wide range of traits in addition to growth rate (see table below). In addition, maternal and terminal indexes have been calculated. This allows farmers to be more specific in sire selection to fit their farm system.

| Economic Indices | | |
|----------------------------|---|---|
| R-EARLY KILL | Growth eBVs x economic weights + Meat eBVs x economic weights + Conception eBVs x economic weight | |
| TERMINAL | Growth eBVs x economic weights + Meat eBVs x economic weights | |
| GROWTH | Breeding values (kg) | |
| Weaning weight | WWTeBV | Higher value indicates heavier at weaning (kg) |
| Autumn weight | AWTeBV | Higher value indicates heavier pre-winter |
| Weight at 12 months of age | W12eBV | Higher value indicates heavier at 10-12 months of age |
| Mature weight | MWTeBV | Higher value indicates larger/heavier hinds |

| MEAT | | |
|--------------------------|-------------------------------|--|
| Carcass weight | CWeBV (kg) | Higher value indicates heavier carcass weights (includes growth and meat information) |
| Lean yield | LEANYeBV | Estimate of merit for increased muscle in carcass |
| Eye muscle area | EMAceBV | Higher value indicates a larger eye muscle - is associated with more carcass muscle and tenderness |
| VELVET | Breeding values (kg) | |
| 2 year old velvet weight | VW2eBV | Higher value indicates heavier velvet weight at 2 years |
| Mature velvet weight | MVWeBV | Higher value indicated heavier velvet as mature velvetter |
| REPRODUCTION | Breeding values (days) | |
| Conception date | CDeBV | Values indicate days different from the average conception date. A negative value = days earlier conceiving which is desired |
| HEALTH | Breeding values | |
| Parasitism | CARLA eBV | Higher value indicates greater antibody level and therefore immunity to internal parasites |

References

For more information including descriptions of traits and how they are calculated see:

Deer Select : www.deernz.org/deerselect

Fact Sheet - Deer Select: www.deernz.org/deer-facts

12. Welfare

The deer industry takes animal welfare seriously and it is a primary consideration in deer quality assurance programmes. It is also the most important aspect of the velvet antler removal programme. The deer industry considers New Zealand's high welfare expectations and standards as an important aspect of market placement and sustainability.

To ensure minimum distress and suffering to deer, a thorough understanding of their normal behaviour and fear responses is required. Conditions can be greatly improved simply by having a patient, understanding and well-prepared person moving and dealing with the stock. Well set up races and yards that work with the natural inclination of deer to move in certain directions also assist greatly.

Welfare is paramount when:

- yarding
- mustering
- handling
- weaning
- transporting
- slaughtering
- removing velvet antler

12.1 General farming practices

The deer industry was the first to produce an animal welfare code under the Animal Welfare Act 1999. The Animal Welfare Code (Deer) Codes of Welfare 2018 can be downloaded from www.mpi.govt.nz/document-vault/1419. This code contains useful guidelines and minimum standards.

12.2 Transport

A separate code and QA programme exists for deer transport. DeerQA transport driver training courses are provided for drivers.

MPI Verification Service monitors all consignments of deer at all premises.

MPI and DINZ publish animal welfare incidents.

12.3 Removal of velvet

Under the Agricultural Compounds and Veterinary Medicines (ACVM) Act 1997, Animal Welfare Act (1999) and Animal Welfare (Painful Husbandry Procedures) Code of Welfare 2005, velvet antler removal is classified as a controlled surgical procedure. It can only be carried out by a registered veterinarian or under the supervision or certification of a veterinarian. An animal owner may be trained and certified to remove the velvet antlers from their own animals. The veterinarian must be satisfied that the farmer has the resources and skills to perform the procedure with minimal distress or suffering to the animal. The NVSB Velvet Removal Programme facilitates the relationship between the veterinarian and the animal owner and has a detailed training and auditing programme in place. This includes aspects of knowledge, animal welfare, hygiene and drug storage and reconciliation. All veterinarians and farmers registered in the NVSB programme are subject to periodic audit.

Velvet removal is performed using local analgesia and haemostasis (stopping blood flow). The stags may be restrained in a crush or sedated for the procedure. Much research has been done to determine the most pain-free way to remove velvet antler and the National Animal Welfare Advisory Committee is satisfied that the current methods are effective and pain free.

References

www.deernz.org/deerhub - There is a large amount of information on this web page relating to welfare during transport and ways to reduce stress during routine on-farm animal husbandry practices.

Deer code of welfare (2018) issued under the Animal Welfare Act 1999.

Animal Welfare Act 1999

Code of Recommendations and Minimum Standards for the Welfare of Deer During the Removal of Antlers.

Notes:

13. Health

13.1 Health planning

Under extensive conditions, deer are naturally healthy with high survival rates and minimal inputs required. Under intensive farming conditions, a more proactive approach to animal health is required.

The deer industry and veterinary profession encourage a Deer Health Review, risk-based preventative approach to animal health management. This involves identifying specific health risks on an individual property and deciding which monitoring and preventative strategies to put in place. Such a plan should be regularly reviewed to ensure the goals are being achieved. A deer health planning tool can be found at deernz.org/deer-health-review

Disease occurs when the right (or wrong) balance exists between the host, the disease agent and the environment. Disease prevention is all about modifying the host's immune system, the environment or the disease agent.

Management for health

Nutrition

- Good nutrition helps develop a good immune system. This includes the right macro and micro nutrients.
- Poor nutrition delays development of the immune system.

Hygiene

- Pasture, paddock and shed hygiene help reduce contamination load
- Cross-species grazing can be a form of pasture “cleaning”

Stress

- Social group disruption, weather, transport and nutritional stress all compromise the immune system

Biosecurity

- Prevent the introduction of new pests, diseases or high-shedding animals

Vaccination

- A useful tool for prevention of leptospirosis, yersiniosis and clostridial diseases.

Genetics

- For many diseases, some animals are genetically better than others at developing immunity.

13.2 Body condition scoring

Body condition scoring is a useful tool, especially for breeding hinds at the following times:

- Late lactation and before mating
- Pre-calving
- Winter

Whole-herd body condition scoring assists the assessment of feed adequacy and changes and the likelihood of reproductive success or disease affecting the herd.

Individual body condition scoring can indicate disease or low status in the pecking order.

A hands-on assessment is required to accurately body condition score deer. Paddock condition can be deceptive.

To download a body condition scoring chart and view a video on the process, go to www.deernz.org/bcschart

13.3 Diseases

Major production-limiting diseases

Gastrointestinal (GI) parasites

- The most significant health issue facing the deer industry
- A range of GI parasites affect deer, the most significant being *Ostertagia*-type parasites of the abomasum
- Young stock are the focus of control as resistance develops with age
- Wapiti/elk and their crosses are more susceptible than red deer
- Reduced weight gain is the most costly effect, but diarrhoea and death can also occur
- Risk factors: Young stock, high stocking rates, wetter climates, deer only, high pasture larval burden, ryegrass pastures, stress
- Management involves pasture management, intergrazing with other species and preventative anthelmintic use
- Anthelmintic choices, dose rates and efficacy are a major deer industry issues.

Lungworm

- The most significant and pathogenic parasite of young deer
- Adults can be affected but natural resistance develops with age
- Risk factors: Young deer, high stocking rate, warm wet conditions, stress, deer-only grazing
- Prevention: Pasture management, intergrazing with other species, specialist pastures, drenching with an effective drench at 24-28 day intervals.

Yersiniosis

- Clinically causes acute diarrhoea, weight loss, dehydration and death
- Can occur in outbreaks with large percentages (up to 30%) of the mob affected
- Caused by a gut bacterium that overgrows when conditions are right
- Risk factors: Stress, bad weather, poor weaner management, changes in diet, transport
- Prevention: Manage stress and feed, vaccination.

Leptospirosis

- A significant human health risk
- Infection is very common, and significant losses can occur
- Most commonly see reduced weight gain. Severity depends on strain. Can cause redwater and sudden death
- Has been associated with reduced weaning rate in yearling hinds
- A bacterium that thrives in wet conditions and is spread via urine of infected animals
- Risk factors: Naïve herd with infected new animals brought in, pigs, sheep, cattle, deer, rats, waterways, heavy rainfall, wallowing
- Prevention: Biosecurity, quarantine treatments, personal hygiene, rodent control and waterway management, vaccination.

Johne's disease

- A bacterial disease affecting the gut
- Can see outbreaks in mobs of young deer, often in their first winter. Tends to be sporadic in older deer, causing wasting
- Affected deer fail to thrive, then rapidly lose weight and muscle mass, develop diarrhoea
- Deer may deteriorate rapidly or look ill-thrifty for several months. Winter coats may be partially moulted in spring, leading to a moth-eaten appearance
- Prompt diagnosis is important
- Risk factors: Stocking rate, environmental management, high shedders in the herd, wildlife, genetic susceptibility
- No treatment, no cure
- Monitoring at works and a reporting scheme managed by DeerPRO.

Fusobacteriosis (foot and lung abscesses)

- Often presents as lameness or sudden death
- Risk factors: Stress, high stock density, wet conditions, transport, foot injuries, rough handling in yard/shed, frequent yarding, yard/shed surface (stones, rough concrete), high levels of concentrate feeding
- Prevention and control: Rubber matting in sheds and on trucks, careful handling in races, yards and sheds, prompt treatment of lameness with antibiotics.

Injury/misadventure

- Common cause of loss in adult stags, weaner deer and newborn fawns
- Can be very costly
- Fawn mismothering and misadventure through fences/gateways, stag injury through fighting and weaner injury often in races and yards are most common
- Prevention focuses on fencing, appropriate stocking rates, gentle handling and design.

Trace element deficiencies

- Individual farm trace element profiles (soil and deer) should be tested to manage profitably
- Copper deficiency is the most common trace element deficiency in deer
- Wapiti/elk and their crosses have a higher copper requirement than red deer
- Clinical copper deficiency in older deer presents as swayback, and in younger deer as swollen leg joints and poor nerve development
- Risk factors: High soil molybdenum, low soil copper, perennial ryegrass pastures, high sulphur
- If required, control is often by injections, slow-release rumen bullet, or fertiliser
- Selenium deficiency is an issue in some regions. Supplementation with fertiliser prills and/or injectable selenium.

Ticks

- Blood sucking insects (cattle tick) that can cause significant production losses in deer
- New-born fawns are particularly susceptible
- Ticks prefer warm, humid environments and can be a serious problem from Northland to as far south as Marlborough
- Worst in summer, but year-round control is needed to break the tick lifecycle
- In affected areas, regular aggressive control is required including animal treatment and paddock management.

Facial eczema

- Can cause reduced productivity in deer throughout the North Island and northern South Island
- Caused by a fungus that grows in dead litter at the base of ryegrass pasture
- Fungal toxins cause damage to liver and urinary system
- Rarely causes skin lesions (unlike other species), but weight loss and scouring in weaners, and arched back during urination in stags may be more obvious
- Monitor spore counts and prevention is by utilising alternative forages during high-risk times like summer. Zinc prophylaxis can be used but is less commonly used in deer.

Clostridial disease

- Sudden death due to clostridial infection can cause significant losses on some deer properties
- Usually well-grown young deer present as sudden death cases
- Prevention is usually by vaccination with a 5-in-1 vaccine, although in some cases 10-in-1 is required.

Other

Tuberculosis (TB)

- Under compulsory TB testing scheme (TBfree, OSPRI) funded partially by levies and partially user funded
- The TBfree programme aims to eliminate TB in New Zealand
- Same testing areas and movement control areas as for cattle
- Very few deer herds with TB (OSPRI reported 3 herds in 2019)
- Controlled by test and cull, reducing wildlife that spread TB, movement control and use of NAIT system.

Malignant catarrhal fever (MCF)

- Historically a major cause of sudden death in deer
- Less common now nationally but individual farms still experience financially significant losses
- Caused by a sheep herpesvirus which is fatal to deer
- Risk factors include proximity to lambing ewes, stress, genetic susceptibility
- No treatment or prevention other than reducing risk factors.

Cryptosporidiosis

- Causes diarrhoea, dehydration and death in young fawns
- Can be severe, with up to 50% of fawns dying, becoming economically crippling
- Risk factors include presence of cryptosporidia and stocking intensity, muddy conditions with faecal contamination. Later-born fawns are more susceptible.
- Often presents as dead fawns but careful management can reduce risk
- Managing water source (changing to reticulated if possible) and ensuring good pasture cover in fawning paddocks (aim for 2,500kgDM/ha) help reduce incidence, as does reducing stocking rate.

Ostertagiasis (formerly fading elk syndrome)

- An issue in elk or wapiti deer and some red breeding stags
- It is thought that stress and loss of body condition during the roar increases susceptibility to infection
- Difficult to treat with current anthelmintics
- Risks include wapiti genetics, pasture parasite burden, stress and weight loss, and possibly concurrent trace element deficiencies.

Ryegrass staggers

- Not a common or highly significant problem nationally but can be distressing
- Deer are relatively susceptible to ryegrass staggers
- Death is most commonly due to misadventure
- Risk factors: High-endophyte pasture, environmental conditions.

References

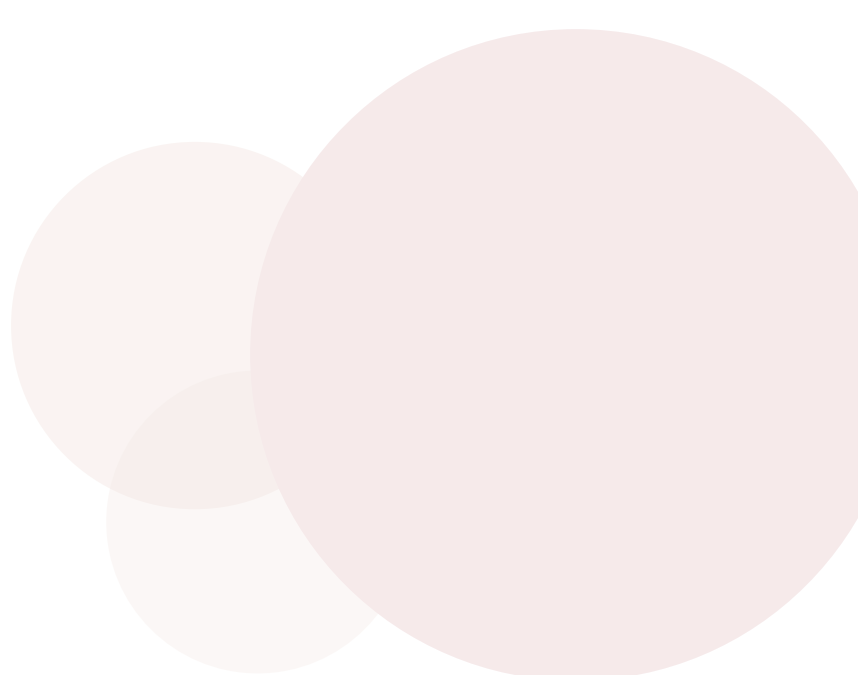
Deer Health Review Workbook: www.deernz.org/deer-hub/tools/health

Deer Health Fact Sheets: www.deernz.org/deerhub/health

Deer Health and Management Calendar:

www.deernz.org/deerhub/deer-information/health/management-calendar-0

Proceedings of the deer branch of the New Zealand Veterinary Association,
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