

THE ALTERNATIVE LIVESTOCK CONFERENCE

Deer Farming - with a perspective on red deer

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Basic deer production

In its simplest form, the farming of deer allows the combination of thoughtful use of a superbly adapted animal to basic farming principles. These include quality pasture growth and management, full understanding of the seasonal calendar and animal requirements, and using the principles of animal care and welfare in a prevention and protection sense.

In terms of market position and future, i.e. the economic fuel that maintains and grows the industry the deer product stream is highly varied, sound, and in keeping with new consumer trends. Ultimately venison production - supply of a light, lean red meat with an exceptionally strong nutritional profile - [low fat, low cholesterol, high iron and protein content] under pins the deer industry in the primary western markets.

Alternative products and end uses: - pharmaceutical use of velvet-antler in traditional oriental and emerging western markets; a role as a trophy animal in managed game parks; a multi-use for edible co-products (tails, pizzles, sinews and offals); and skins as high value apparel; are becoming increasingly significant in the developed deer industries. In early establishment phases an emphasis on live animal sales for foundation stock is very important as is industry promotion. Relative product price levels, stock availability and a tangible demonstration of the opportunities for growth and sustainability all combine to ensure confidence and integrity in what is inevitably a major investment.

Any alternative livestock diversification relies on the adaptation and flexibility of the chosen animal to maintain its production with the constraints that farming places on it. With deer this is critical as we as farmers take responsibility for the animals welfare and remove its freedom of choice by fencing and containment. The most successfully farmed deer species in North America,

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red deer, fallow deer, elk, sika and to a lesser extent whitetail share some important common attributes that underpin their farming adaptability and production traits.

Broadly:

- Farmed deer are highly adaptive, gregarious, herding animals that suit being managed in large groups and can be yarded, handled, moved and maintained on pasture on herd principles. Dealing with individuals in yards or on pasture is assured of being difficult and potentially risky.
- Deer are temperate species, well adapted to climatic extremes behaviourally and physiologically, and are highly seasonal in breeding and growth patterns. These are well matched to the seasonal on-farm conditions of pasture availability and farming techniques.
- The combination of herd structure - a normally stable female herd base and a mobile competitive bachelor male population, allows refinement on farm to include:
 - high female: male ratio allowing huge selection pressure on genetic merit for breeding stags/bucks.
 - on-farm division into age and sex classes and production systems that allow differential feeding and care to maximise growth and production.
- The investment in female breeding stock concentrates resources on the most easily managed and most profitable sex in a developing industry.
- Deer are highly adaptable to climate, farming terrain and type, available food resources and production and management systems.
- Deer share features of good health, long life (12-16 productive years) and are relatively disease free and sociable animals with a flexibility that allows any variety of interaction between farmer and deer in handling and management.
- The major farmed species (red deer, elk and fallow species) all can be used in aspects of crossbreeding or hybridisation programmes to advantage the productive flexibility of these deer and virtually design a farming system to suit a market niche or desired production outcome.

In summary, farmed deer have proven to be the most noble, successful and adaptable of animals in a world-wide variety of temperate farm environments. Farming deer also adds the wealth of

appreciation and enjoyment of a responsive animal to a profitable and expanding market position of the deer industry.

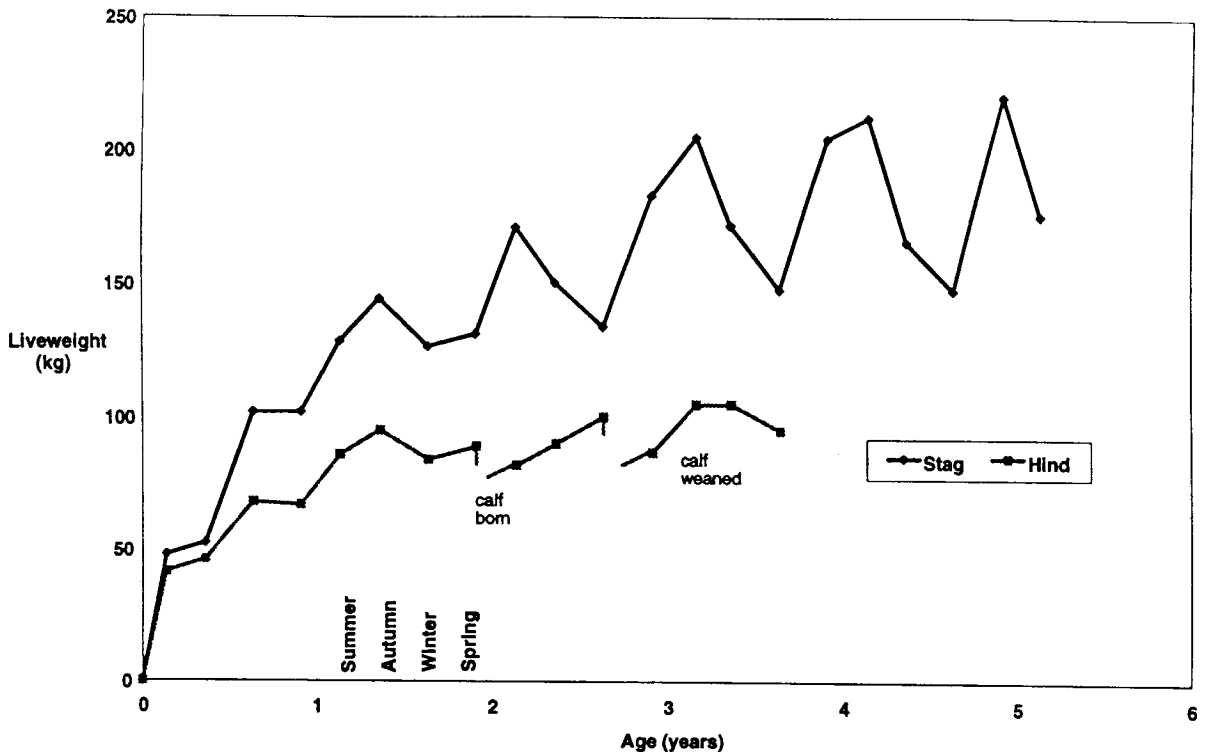
The success of basic deer production however does rely on the understanding of and appropriate on-farm reaction to some basic principles - and differences from traditional livestock.

A. Seasonality of growth and production

In deer all patterns of growth, the antler cycle, changes in behaviour and the breeding and reproductive cycle are specific controlled responses to changes in daylight length throughout the seasons of the year. The link is a complex pathway involving sensing of changes in night length via the pineal, melatonin hormone, hypothalamus system and subsequent hormonal pathways via the pituitary and reproductive glands.

The resultant patterns in growth and development are represented in Fig 1 and demonstrate rates of growth that are high in spring and summer and much reduced in fall and winter. Data for red deer are shown, but there are similar patterns for elk- wapiti and hybrids and fallow deer. This cyclic seasonal growth pattern forms the basis for development of farm management systems.

Figure 1. Patterns of liveweight change in red deer stags and hinds with season and age.



Important points to note are:

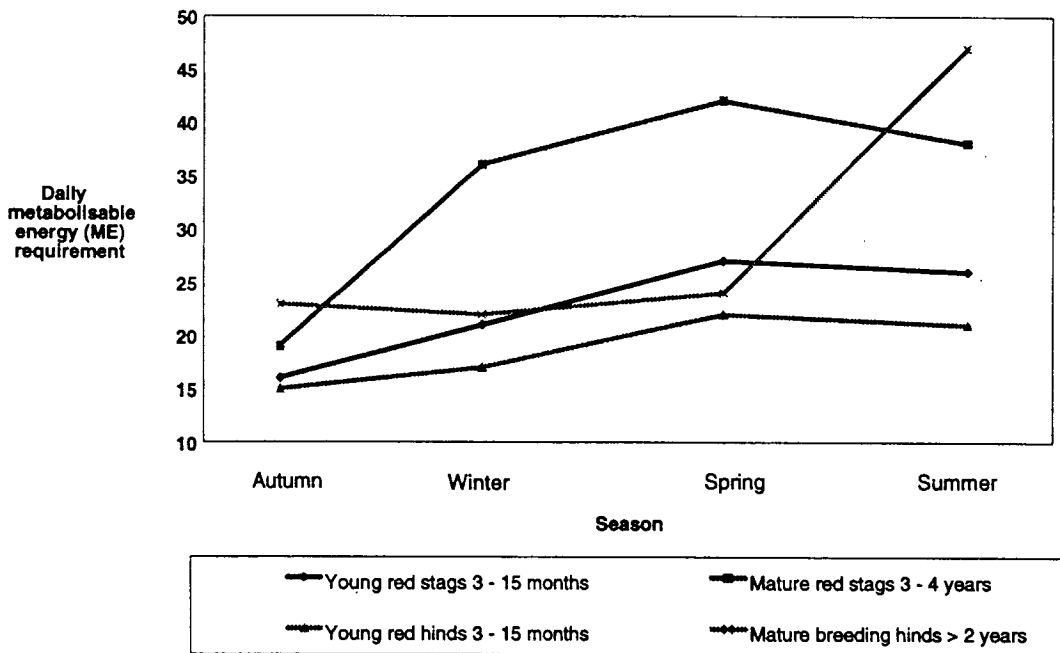
- Lack of growth opportunity in winter does not mean that feeding levels and quality of feed offered can be reduced. The low level of body fat and physiological adaptations to harsh winter conditions require good levels of high energy quality feed for maintenance particularly in stags.
- Live weight plateaux at 15 months, and at 27 months mark ideal “productive points” for venison production and are a good balance between the on-farm calendar and animal performance and seasonality.
- The ages 15 and 27 months also mark important points in management - the breeding, weaning and selection times.
- Growth from birth to weaning is a critical period and can be positively influenced by sound lactational management. This advantage, gained cheaply and efficiently while fawns are reared, stands the animal in good stead for its productive lifetime.
- Reproductive success, which is a major determinant of farm profitability can only be maximised by achieving the required target weight for age in young males and females. Adult

deer must be fed to their full requirements to achieve greatest expression of the genetic potential for antler growth, milk production and conception rates.

Fig 2 contrasts the differences in seasonal feeding requirements (expressed in energy intake terms) for different sexes and ages of farmed deer and emphasises the different needs of the deer throughout the yearly calendar. Looking at these differences it becomes quickly obvious that there is need and advantage to separate the age and sex classes on farm to allow the differences in management required.

Thus, unless numbers are small (say only 5-10 deer) any farm system must incorporate effective farm subdivision and fencing control to allow this.

Figure 2. Daily metabolisable energy requirements for growth and production targets in red deer.



Features of the age/sex class differences, expressed in feeding demands are

1) Adult hinds

- Huge feed demands for a breeding hind and her calf during the summer period
- Relatively low demand over winter as long as body condition is good through the fall.
- Increased demands in fall over the breeding season required to add to conception rates and avoid embryonic mortality

2) Young hinds, stags -

- High feed demands and live weight responses in spring - the great potential for growth in young animals.
- Good feeding over weaning and in winter to avoid stress, produce limited growth and avoid stresses that can invite disease or loss of production.

3) Adult stags

- Dramatically restricted intake and demand during the intensive breeding season or “rut”.
- Dramatic increase in feed intake over the winter and early spring period
- Relatively high demand in summer.

Extensive studies on carcass composition and live weight changes reveal what lies behind the saw tooth changing live weight pattern (Fig 1) for adult stags. Over the rut or breeding season virtually all fat reserves are mobilised in a 6 week period where up to 30% of live weight can be lost by adult stags because of reduced feed intake. This places the animals in an extremely vulnerable position going into a harsh winter environment with little or no fat reserves and in a high risk position for imposed on-farm stress. At a time when there is no pasture available and intake of low quality bulky feeds is restricted simply by gut fill limits, stags must be offered high energy rations, (grains or formulated pellets) in combination with high quality hay or haylage/silages.

Cold weather survival in what are expensive and key animals is critical. Proper feeding is necessary.

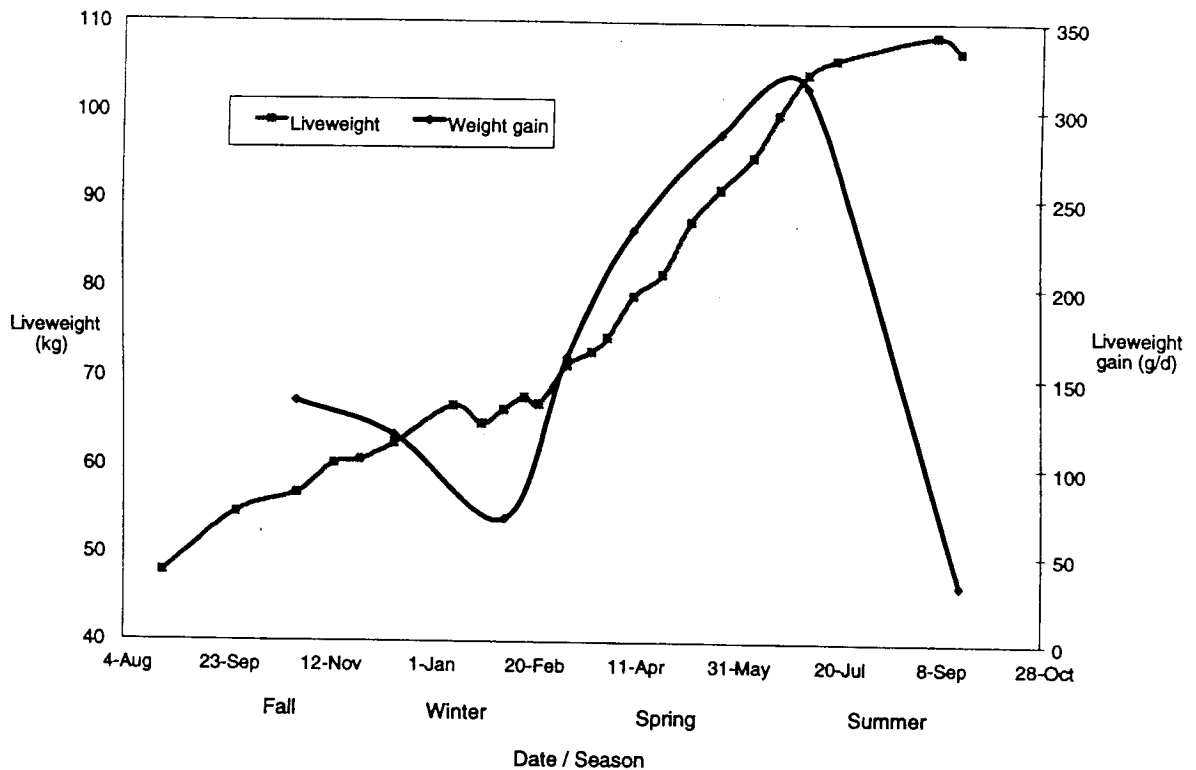
Stags need excellent feeding in spring to give full expression to antler growth and use the summer period to rebuild fat reserves for the oncoming breeding season.

As a general rule stags over 3 years of age can only be available for top quality lean venison production after the breeding season and they are more easily handled and less stressed and at a time when fat reserves are minimal. Modern on-farm venison production focuses on the 12 - 27 month old males for reasons of carcass quality and leanness and for efficiency in farm production systems and of course profitability.

The full impact of the ability to grow as young stock is presented in Fig 3 which shows the seasonal pattern increase in live weight, and for daily live weight gain in red stags kept indoors and fed without restriction from weaning to 18 months of age.

Similar features are seen in hinds although about 20 - 25% less in performance. In an outdoor farm environment animals will grow to the indoor pattern, but 15 - 20% less over the seasons given the effect of greater energy required for body warmth and maintenance in outdoor conditions. Shelter can effectively be used to improve this loss and must be considered in North American winter conditions.

Figure 3. Ideal growth curve for young male red deer.



The most significant feature of this growth curve, and the feature that distinguishes deer and traditional livestock is the rapid change from winter response to rapid in spring growth.

The trigger for growth is linked to photoperiod response in the later winter, early spring (mid-late February in Northern hemisphere). Appetite or intake increases at ~10% per week from this point for a 6 - 7 week period. To maximise growth, reach puberty, reproductive potential, or venison target slaughter weights, feed management has to meet this demand.

Often this occurs before the natural spring pasture growth and meeting this demand from high quality conserved feed sources is critical.

Growth can be achieved over winter but not at high levels, and there is some evidence that a small level of compensatory growth can be achieved in spring. Reduced winter feeding is not appropriate on animal welfare grounds and because of the high risk through stress and disease.

The match of North American mid western pasture species type and their growth and quality is ideal for deer production provided pastures are managed for quality rather than bulk. Towards the

late summer, again under the photoperiod seasonality influence, young deer will have reached their pubertal plateau, and have been through cycles of antler growth, teeth change and preparation for their first reproductive opportunity. If growth potential has not been fully utilised during the spring period, it is extremely difficult to catch up at this late stage.

Table 1 reviews expected live weight growth and target gains expected for average and well managed herds under New Zealand pasture based conditions and a 100 day winter season.

Table 1: Seasonal growth pattern and relative seasonal feed energy requirements of red deer from weaning to 15 months (stags starting at 48 kg, hinds at 44 kg live weight)

	Autumn	Winter	Spring	Summer
Stags - average growth				
Live weight gain (g/day)	150	50	200	180
Target live weight (kg)	58	63	83	101
Relative energy required	100	104	119	125
Stags - excellent growth				
Live weight gain (g/day)	200	100	300	240
Target live weight (kg)	61	71	101	125
Relative energy required	100	107	133	138
Hinds - average growth				
Live weight gain (g/day)	106	35	141	130
Target live weight (kg)	51	54	68	82
Relative energy required	100	106	114	119
Hinds - excellent growth				
Live weight gain (g/day)	140	70	211	180
Target live weight (kg)	53	60	80	98
Relative energy required	100	109	126	131

Evidence from deer from the same genetic backgrounds imported from New Zealand to North America suggests that the same, if not marginally better production, can be achieved in these farming environments.

There are a number of important reasons for this success:

- Deer are still influenced by the same photoperiod cues so that seasonality and growth patterns are maintained.

- In spite of a 200 day winter, conditions for good animal health - dry cold winters and warm favourable spring/summer pasture growth conditions minimise disease risks, parasite burdens and stress. Cold wet conditions are not helpful to good deer production.
- Conserved feeds - hay, pasture and corn silage, and grains are very high quality and can be made and stored with little wastage or deterioration. Winter feeds are comparatively inexpensive and deer can be fed to appetite and requirement cost effectively.
- Pasture growth favours highly preferred species, legumes (alfalfa, red clovers) and grasses, (timothy, bromes, fescues) and these reach maximum production at a critical timing in animal growth patterns - (calving and lactation and growth of young stock).
- Agricultural land has been developed, well balanced with woodland shade or shelter complementing cropping and pasture land in many situations favouring animal behaviour and welfare considerations.
- The knowledge and appreciation of native deer living in the wild is a common factor to many now farming deer. Good deer farm managers have a similar understanding of the needs of farmed livestock and use such appreciation particularly well in managing and handling farmed deer.

The emphasis on growth and production, in particular for young deer, has very immediate and practical rewards.

- The profitability of venison production with young stags at the ideal age of 12 - 18 months is greatly improved by hitting target weights as early as possible, or by having heavier animals at the end of the growth season.
- Young females need to achieve a minimum of 70% of their final mature weight by puberty and first mating at 15 months of age to return potential conception rates of 85% plus. In red deer this equates to a minimum weight 75 kg (175 lbs). For fallow deer 15 month pre-mating weights should be at least 36 kg, and mixed aged does 45 kg.
- In terms of general selection, heavier well grown males at 15 months tend to have better lifetime velvet antler production than average or poorer herd mates (within the same blood lines).
- Deer fed to their seasonal requirements avoid stress, management related diseases, problem behaviour and handling difficulties.

This discussion has spent some time emphasising seasonality and the importance of feeding, simply because it is so basic to all that is important in deer production.

A detailed annual calendar of management and animal health procedures is presented at the end of this paper as a general reference guide.

However, in terms of basic deer production there are other important aspects of seasonality and animal needs that greatly affect a successful deer farming operation.

B. Breeding management, selection and genetics

Because deer are strictly seasonal breeders there is a great opportunity to use these natural features to aid management and successful production..

The natural breeding season has a very specific starting time in the second or third week of September, and is determined mainly by the breeding stags readiness. An individual stag is capable of mating 40 - 60 hinds over a 6 week period. This allows the selection of a few genetically superior males to gain maximum benefit for a herd improvement programme.

An investment in a breeding stag should be carefully considered within the long term breeding objectives of the programme.

That is the first critical step, defining that objective, the “where do I want to be in 5 years”

Questions involved include “Is the operation at its best producing velvet antler, venison, foundation stock for live sale, or developing a stud herd?”

“Are the physical aspects of the farm suitable for this objective, climate, location, choice of deer type, feed availability?”

“What level of investment is required, and what rate of returns are needed? How are these returns realistically going to be achieved, (venison, velvet, live sales of hinds, breeding stock, stud stags)?”

“How much time input is needed in the operation? How big should the animals become? Can I manage and handle the results?”

Once these questions are clearly answered, the breeding options and choice of stag and management system become quite clear. Amongst the family of deer, many of the different types of strains will freely hybridise and produce fertile offspring. There is a huge variation of size, antler shape and other characteristics that with careful selection allow the breeding of new types of deer with improved production characters that suit individual markets, the farming operation or simply the enjoyment of the investment. The final stage in a breeding programme requires appropriate recording of animal performance and seeking maximum genetic expression through good management.

In an intensive operation with well defined objectives, single sire mating is the most practical and rewarding technique. Hinds can be selected for their superiority as expressed through:

- weaning weights of calves, (the lactational advantage)
- early calving - calving date, i.e. the ability to conceive early in the season and to feed calves well, taking advantage of spring and summer pasture growth peaks.
- manageable temperament - hinds that are stress free through calving, weaning and can be handled at will. These animals also make excellent candidates for artificial breeding and embryo transfer programmes, to fully utilise the world wide base of truly elite genetics now available through routine reproductive technology.
- Annual mid winter weights - the true representation of female growth expression, (lean body size, production and efficiency).
- 15 month weight and ranking in a herd group.

Elite stags, should be selected from the top 3% of any age group based on the character, or characters desired. For deer production this should place these animals 2 or 3 standard deviations above the mean, i.e. those that express the extremes of natural variation for these genetic production characters. However it is important to remember that the more characters that are selected for, the less progress is made for each. Table 2 illustrates the sort of progress that can be

made by selecting for velvet weight using within strain selection, or outcrossing to different strains, or hybridisation between strains. Table 2b shows the variation in live weights and differences between males and females in size available that allow the flexibility to produce productive deer ‘designed’ for a wide range of farming outcomes.

In any programme, excellence still requires the choice of the best genetics available. A mere increase in size, just because its bigger is not efficient unless that size increase represents the top merit of that bloodline.

Table 2a: Comparison of various breeding options to improve velvet antler production (comparisons as 4 year olds) (Fennessy 1989).

Breeding option	Velvet antler production (kg) as 4 year olds			
	Breeding animals		Genetic progress per generation	Yield of progeny
	Stags	x Red hinds ^b		
	Selection within strain			
Average stags (NZ/English Red)	2.5	2.5 ^b	0.0	2.50
Top 3% of stags	3.6 ^a	2.5	0.22	2.72
	Hybridization between strains ^c			
A) Average stags	3.6	2.5	0.55	3.05
Top 3% of stags	4.2	2.5	0.87	3.37
B) Average bulls	5.2	2.5	1.35	3.85
Top 3% of bulls	7.5	2.5	1.81	4.31

^a Assuming a standard deviation of 0.5 kg, a coefficient of variation of 20% and a heritability of 0.40 for velvet antler weight

^b The hinds are average red hinds giving male progeny from mating with average red stags that would be expected to produce 2.5 kg of velvet antler

^c Calculations assume no hybrid vigor (i.e. progeny of average superior strain and average red hinds are midway between the parents)

A. Typical scenario East European strains of Red Deer.

B. Canadian Wapiti bulls in a F₁ hybridisation programme.

Table 2b: Yearling live weights of the various strains compared with NZR (100) and the ratio of male to female yearling live weight within each strain (sexual dimorphism) (Fennessy & Pearse 1993).

	Male	Female	Average	Sexual dimorphism
NZ Red (NZR)	100	100	100	123
¼ German/¾ NZR	108	112	110	119
Hungarian x NZR	130*	118	124	110
¼ CW/¾ NZR	117	122	120	115
¼ Père David's (PD)/¾ NZR	124	128	126	120
Hungarian x Hungarian	148*	139	144	106
Elk x NZR	172	147	159	117
¾ Elk/¼ NZR	142	159	151	108

* recent estimates from breeders.

The figures for sexual dimorphism are important in venison systems as the closer the male : female live weights are the more appropriate are the females for premium weight related venison production.

In selecting breeding stags important records and selection criteria include:

- weaning weight (and herd ranking).
- 15 month weight - spike antler weight.
- 27 month weight
- 2 year old velvet weight (including days growth and grade or antler definition characters, beam diameter, style)
- subsequent velvet weight and grade per year
- annual mid winter lean weight, (peak weight prior to the rut is interesting but often reflects extremes of luxury summer feeding), and
- hard antler characteristics, longevity, temperament "strain or type and style.

Practical considerations for successful breeding programmes

- 1) Early weaning ~ 2-3 weeks prior to mating to allow hinds to regain condition after lactation, and maintain a slowly rising plane of nutrition for 6 - 8 weeks prior to winter. The primary advantage of early weaning also preferential feeding to calves is to increase the number of

hinds that conceive to the first oestrus cycle which has a lead on effect in hind/calf management.

- 2) Stag preparation:- Sorting, handling and transportation of breeding stags should be done 6-8 weeks prior to mating to avoid any stress or impairment of performance.
- 3) Mating groups should be physically separated to avoid fighting and aggression and left undisturbed if possible.
- 4) Primary sires should be used for 38-40 days (September and October) and replaced by back up or chaser stags. This insures against any low fertility or breeding problems, which although rare do occur. Chaser stags should only be offered a limited mating time ~ (mid-late November) as late born calves create more management problems than a few additional calves warrant even in times for high valued livestock.
- 5) Accurate records of mating groups must be kept where genetic progress is an objective. It is now routine (in New Zealand) through ultrasonic pregnancy diagnosis to identify early and late conceived calves and to verify parentage through DNA and blood protein testing. Good records also aid in identifying any underlying management problems - e.g. poor calving performance.
- 6) For social and behavioural reasons it is more practical to mate 15 month hinds separately from adults. However, often these groups first cycle 2-3 weeks later than adults, and if restricted mating is used, lower conception results can occur. A small number of adult hinds (5-10%) run with the group can induce earlier cycling and add some social stability to young animals.
- 7) Early weaning also allows the application of synchronised matings and AI programmes prior to the main breeding season, so that late calves don't result from follow-up matings. However, success in these requires the development of a stress-free handling routine, good feeding and application of a detailed timed preparation programme.

- 8) In some situations a more extensive approach is warranted, using weaned or unweaned stock, with multi-sire mating with adult or even a greater number of well grown yearlings. Farmers should not commit to this commercial approach which has an emphasis on reduced time input and venison production, and expect to make more than general improvement in herd quality or production. Multi sire matings require large pastures with space and terrain that encourage individual harem building and reduction of fighting and competition.
- 9) After mating, stags should be removed and be maintained in a separate group to allow preferential feeding to recover from rut activities and the huge weight loss. This is an important protection of an investment in elite stock and can add an advantage of improving velvet antler growth in the following season.
- 10) Post mating the breeding female herd requires good maintenance feeding as winter approaches, and evidence of sudden changes in feed levels. Major diet changes must be introduced slowly to avoid any stress/disease risk and effects on embryonic viability, or acidosis - feed related illness or death.

Good production, genetic progress and profitability in breeding relies on

- a) having clear objectives,
- b) selecting appropriate elite stock
- c) recording objective performance records and animal identification
- d) planning a programme in advance in keeping with the objectives. These combined under-write a long term commitment to herd improvement. To support that commitment a wider view of the industry and its potential must be taken when considering objectives.

C. Animal health and welfare considerations

Farmed deer have proven to be particularly healthy with relatively few production limiting diseases threatening animal welfare. Details of standard preventative animal health programmes are developed in the management notebook.

In general terms, the minimising of health problems relies simply on avoidance of management related stress and implementing a pre-planned animal health programme.

On farm stress in deer can be extremely subtle and often remains undetected until serious and threatening problems emerge.

In order of severity, or frequency of occurrence the major stresses are:

- undernutrition - particularly in winter and fall, although poor pasture management in summer can also create quality pasture shortfalls in spite of appearances.
- bad weather - combinations of both cold and wet conditions - ice storms, cold spring rains, thunder storms.
- heat exhaustion - lack of shade and shelter, particularly in newborn calves.
- overcrowding; mixing unfamiliar animals or groups
- grain overload - acidosis - caused by overfeeding of "hot" rations (grains or formulated pellets) without an appropriate gradual introduction period, sudden changes in diet, or feed dominance by individuals and gorging.
- management related; poor handling, excessive disturbance, unfamiliar routines, anxiety and hassle in yards or on pasture.
- physical; poor fencing and facilities construction posing injury risk, obstacles or hazards on farm (foot injury, bruising).
- hard antler damage, fighting, aggression, poor temperament
- disease risks; tuberculosis, leptospirosis, MCF, Yersiniosis, parasitism, rabies, clostridial diseases.

Most diseases are preventable, either through following strict testing procedures prior to stock purchase, (Tb, leptospirosis, etc.) or form part of a routine vaccination programme.

Under any of the management related stresses deer can become very susceptible to other invasive diseases. Often in new operations the problems can compound and present a major crisis. Typically under stress, parasites or invasive bacteria can gain a threatening hold with great speed. Failure to act on intuition or first signs of a problem is the greatest cause of wastage in farmed deer, and frequent and open consultation with veterinary advice is essential. In most instances deer are no different from other farmed ruminants and the same sound basic principles of

preventative animal health programmes and emergency treatment apply. Any deer under threat of stress or disease or injury must be able to be yarded quietly and kept in darkened conditions with food and water until veterinary assistance can be obtained. No farm should be in operation without yards. These are as essential as the boundary fence.

For the most effective treatment and control it is vital that good records of management practices and production are also available.

Other known limits to production critical to deer involve a complex of essential and trace minerals, particularly copper and selenium, and to a lesser extent cobalt, phosphorus, calcium and sodiums. Some areas may be deficient, but a combination of soil testing in a local area, relevant veterinary advice from other livestock production and a preventative approach eliminate most problems.

In summary a planned animal health treatment programme is simply established and administered at critical times of the year. Animal welfare on farm then only requires minimising any imposed stresses due to farming practice, and feeding to seasonal demands.

D. Antler growth

The annual growth of antlers is perhaps the most dramatic difference between deer and other livestock, and also has an important aspect in farmed deer production as a product stream.

Antler growth is perhaps the most visible expression of deer growth and seasonality, and equally the role that deer velvet antler plays in oriental medicine and pharmaceutical medicines offers the deer farmer an important revenue area and demanding responsibility.

Growth features

In adult stags new antler growth follows the shedding or casting of the previous years bone antler under hormonal influence and the photoperiod link. Stags produce virtually no testosterone at this time in late winter and behaviourally are at their quietest. Antler grows rapidly as a complex

cartilaginous tissue well supplied with nerves and extensive blood supply at quite astonishing rates and differentiation.

Growth comes from the forming tips of the various tines and main beam under strict genetic and hormonal control of timing and style. It has a corresponding gradation of tissue types moving down the antler from an undifferentiated growing cell mass, changing to a cartilage matrix, a honeycombed cartilage and finally to calcified cartilage and early bone formation at the base from about 65 days onwards.

This differentiation forms the basis of the traditional oriental grading system that reflects both the price and pharmacological properties and usage - and impacts on farming practices - the harvest date, and velvet grade.

It is important to realise that the most appropriate time for antler removal occurs just as bone forming occurs at the base. The animals are still non aggressive and easy to handle, and the antler is at a stage where maximum value can be obtained. But removal is a sensitive procedure. This is living nerve and blood supplied tissue.

There is no justification to compromise animal welfare in velvet antler harvest. Removal is a veterinarian procedure requiring full analgesia. A strong case can be made for removal at this stage even in the absence of any market opportunities as hard antlered stags on farm inevitably provide potential of severe animal - animal injury and risk to farmers alike in a confined pasture or yard situation.

Management for production

- Older stags cast and regrow significantly earlier than young stags with up to six weeks difference to 2 year olds, but individual variation is high. The pattern and timing of tine initiation and growth is broadly similar over all ages.
- Velvet antler weight increases with age until peak production at 6-8 years of age then gradually declines. A general positive relationship exists between live weight and velvet antler weight

within an age group and a bloodline. For every 10 kg increase in body weight expect 0.10 kg of antler weight increase.

- Older stags with greater beam, weight and earlier growth and casting can be grown out to a greater extent before harvest. Young animals should be cut earlier rather than later to preserve quality. Because of the difference in growth styles, animals should be split into small groups (10-20 animals) based on casting dates to assist in the harvest management and to avoid yarding of stags in different stages of growth.
- Harvest time can only be determined by assessing the antler as a whole and removal before calcification begins. An intimate knowledge of style and grading and changing market requirements is important.

For the removal of antler without stress, damage, or compromise it is vital that the facilities are adequate and that deer are familiar with the routine and procedure.

Sources of damage come from haste and inexperience, overcrowding in yards and poor preparation. Full consultation with the veterinarian prior to the season will eliminate potential problems.

- Antler is a valuable edible product. Care must be taken to provide full conditions of hygiene and storage. As a product it should be treated with respect in its application and end-usage to prevent public misconception of the harvesting procedure and long established position in oriental medicines.

Deer production summary

Opportunities to add to and improve this aspect of deer production to rely on the basic principles of establishing an objective and selecting the appropriate genetic resources to achieve that objective.

The application of feeding to seasonal requirements is still the most important aspect in all farmed deer production.

The farming of deer is not difficult, and suits the mid western environment very well.

Our skill as managers is to provide the resources in feeding, shelter, farm facilities, fencing and handling areas in order to provide all the requirements for a safe efficient and cost effective farming system that best expresses the deer's natural productivity and expression as a remarkable livestock animal.

In the experience of many who have successfully adapted these principles, deer farming offers an enjoyable profitable and sustainable alternative to traditional livestock farming.

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