

A HISTORY OF OSTRICH FARMING - ITS POTENTIAL IN AUSTRALIAN AGRICULTURE

M. Y. HASTINGS

SUMMARY

Ostrich farming originated in South Africa in the 1860's. The Australian industry commenced in the mid 1870's and by the early 1900's there were several large farms throughout Australia. In 1914, following a world wide slump, the ostrich virtually disappeared from Australian agriculture but interest was revived in the late 1970's. The industry is still in it's infancy as there are only small numbers of birds and many problems have been encountered in production.

The main constraining factors are: infertile eggs, embryonic mortality and post hatching leg deformities. The major areas that require further research are the nutrition of breeding birds and chicks, and incubation techniques and equipment.

There are established markets for ostrich leather, meat and feathers throughout the world. These are far from being saturated. The Australian Ostrich Industry has a great deal of potential. However it's success is dependent upon solving present problems and developing substantial guidelines for future growth.

BACKGROUND

The ostrich was first farmed during the 1860's in the Karoo and Eastern Cape regions of South Africa (Osterhoff 1979; Smit 1963). Douglass (1881), a pioneer in ostrich farming, claimed that in 1867 he was the first to make this his sole occupation. He also patented the first ostrich incubator ("The Eclipse") in 1869.

As there was very little capital or labour required, bird numbers increased rapidly, particularly when the use of incubators became popular. In 1865, when the first South African ostrich census was taken, there were only 80 tame birds in the Colony; by 1875 numbers had increased to 32,247. Distribution was over a wide area, however the Oudtshoorn district was one of the major centres of production (Harting and Mosenthal 1877). In 1910 there were 747,000 birds being farmed in the Cape Colony, producing \$US4,546,000 of exported feathers (Osterhoff 1979). During the first 100 years, the industry suffered three notable declines in bird numbers; 1883-1890, 1894-1899 and 1914-1945. The first two were the result of severe drought and an epidemic of unknown aetiology which caused very high mortality (Smit 1963). The third and most publicised slump, was ascribed to World War 1 (Osterhoff 1979), though other factors were involved.

By 1914, a social stigma was associated with the wearing of feathers and groups of bird-protection organisations began a series of campaigns aimed at preventing wild-bird plumage from entering the London and New York markets. Although ostrich plumes were not targeted, the unfavourable publicity caused a decline in demand for ostrich feathers as a fashion accessory (Doughty 1973). At the end of this slump only the best birds remained and these formed the base of the present South African flock, which partly explains the high quality of the birds which now comprise the industry (Smit 1963; Osterhoff 1979).

AUSTRALIAN OSTRICH FARMING

Ostriches were first imported into Australia in 1868 or 1869 when the Zoological and Acclimatisation Society of Victoria acquired five immature birds from the Cape Colony. Of these, two were males and three were females, one of which proved to be barren (Anon 1873). The birds were later moved to the Wimmera under the care of Mr Samuel Wilson who harvested feathers which were later sold at high prices.

The South Australian pioneer pastoralist, T.R. Bowman first attempted to farm ostriches in the mid 1870's (Iwanicki 1985), and by 1904 was running nearly 500 birds at Campell House Station. In 1881 W. Malcom established the Barossa Ostrich farm with 7 adult birds from M. Bowman of Port Wakefield and 3 adult and 13 young birds from South Africa (Herbert 1913; Iwanicki 1985). Later, W. Malcolm formed "The Malcolm Ostrich Company" in partnership with Francis Bignell at a site north of Port Augusta. The company flock was enlarged by the importation of a further 94 birds from South Africa, but soon after, in 1885, the partners sold their business (Iwanicki 1985). It then became the "South Australian Ostrich Company" with the major shareholders being J.B. Cudmore, J.H. Angus, T.R. Bowman and J.M. Anderson. The company was formally wound up in 1916 and almost three hundred birds were moved to Priors Farm at McLaren Vale south of Adelaide. In 1926 all the stock were sold to a circus (Iwanicki 1985), marking the end of an important facet of ostrich farming in Australia.

Fortunately however, birds were purchased contemporaneously by other potential ostrich farmers throughout Australia. By 1913, J. Barracluff of South Head, Sydney had one hundred birds. In 1900, a pair of ostriches was placed at the Hawkesbury Agricultural College and their feathers won a gold medal at a Franco-British Exhibition. In 1905, Cairnes of Nardoo, and Sanderson of Gilgandra started a company with 6 birds purchased from the South Australian Ostrich Company. In 1907 the flock was moved to Coonamble and by 1913 had increased to 550 birds.

A very important flock in Australian ostrich history is the one at Yanco. In 1913 this flock contained 90 birds. Among these were 12 Sudanese ostriches which had been imported from North Africa in 1912. At the Yanco Experiment Farm these were mated with birds of the South African strain purchased from South Australia (Herbert 1913) to improve feather quality.

After the 1914 slump the ostrich disappeared from Australian agriculture to zoos, wildlife parks and some were kept as pets. The ruined buildings and fences of the Port Augusta farm are still visible on the western plains of the Flinders ranges. The current owner is farming the remaining feral ostriches which are descendants of the original flock (Iwanicki 1985).

PRESENT SITUATION AND PROBLEMS

In the late 1970's and early 80's a number of farmers became interested in the potential of farming ostriches. Procedures for farming and breeding were not well known and information was hard to find, thus flock numbers increased very slowly. In 1988, the Australian Ostrich Breeders Association was formed and now has members successfully breeding birds in New South Wales, Victoria, South Australia, Western Australia, Queensland and Tasmania. In 1990 it had a membership of 113. Eighty-five per cent of members are in Victoria and New South Wales. R.Elliott (pers. comm. 1991) estimates that there are presently approximately 1870 birds in Australia.

There are many factors responsible for the slow rate of growth of the national flock, among them, reproductive failure. A study was conducted by the author in 1990, on the incubation records of eight breeding pairs. These pairs laid on average, 52 eggs, with sixty percent of these being fertile. Only twenty-eight percent of eggs produced viable chicks. The data were divided into eight categories: infertile eggs (42%), embryonic mortality (15%), embryonic deformity (1%), mal absorbed yolk sac (3.5%), mortality at hatching (5%), post hatching leg deformities (2%), deaths under three months of age (3%) and viable chicks (28%).

Infertile eggs

Infertility is the major single limiting factor in production. Eggs from seven of the eight breeding pairs studied showed infertility levels ranged from thirty to sixty per-cent. Some eggs recorded as infertile however, may have suffered embryonic death.

Discussion revealed that in all cases breeding pairs were left together all year. The practice of "camping off" (separation of the sexes) may increase egg fertility, especially at the commencement of the breeding season which is when the highest incidence of infertility was observed. This could be attributed to early low virility, decreasing the incidence and effectiveness of mating.

Embryonic mortality

Eggs of all breeding pairs suffered some embryonic loss. The data are likely to be conservative because some embryonic deaths may not have been detected by farmers. Hermes (1989a and 1989b) indicated that nutrition, genetics, disease, and the temperature and humidity during egg storage, all affect embryonic mortality. Nutrient deficiencies or imbalances in bird nutrition also result in a higher incidence of embryonic death. Vitamin B2 (riboflavin) and vitamin B12 are known to be important in embryo survival. A deficiency of vitamin B2 increases embryonic death half way through incubation, with embryos showing dwarfism and some signs of oedema. Vitamin B12 deficiency also increases embryo mortality during the intermediate stages of incubation with embryos exhibiting peri-orbital oedema, short beaks, curled toes and poor leg muscle development (Hermes 1989a).

Inbreeding increases the incidence of embryo mortality, and undesirable recessive genes and lethals, manifest themselves in reduced hatchability (Hermes 1989a).

Temperature and humidity during egg storage also affects the viability of the embryo. When air temperature surrounding the egg during storage increases, the length of time it can be stored without reducing hatchability, is reduced. The humidity of the storage environment is also important as this affects water loss from the egg (Hermes 1989b).

Infection of the embryos too, can reduce hatch rates significantly. Some organisms that are commonly involved are: *Pseudomonas*, *Serratia*, *Enterococci* and *E coli* (Peters 1989). When infection is a cause, the whole batch of eggs is likely to be affected.

The level of embryonic death is a very important parameter, causing a large decrease in the potential productivity of breeding pairs. The problem is complex and detailed records should be maintained by farmers so they can be used to identify causal factors.

Embryonic deformities

The incidence of deformed chicks at hatching was very low despite the possibility of inbreeding (Hermes 1989a). Most of the present breeding stock came from a limited number of birds (Anon 1873; Herbert 1913; Iwanicki 1985), and there is thus likely to have been some inbreeding which is known to be positively associated with deformities in chicks (Hermes 1989a). The low levels of deformity (average 1%) recorded however, suggest that inbreeding is probably not a major problem in the industry.

Mal absorbing yolk sac

The occurrence of chicks hatched before full resorption of the yolk sac is thought to be a result of overly enthusiastic assistance in hatching. The study showed the incidence varying from 0 to 10%. Dolensek and Bruning (1978) suggested that if the chick is given insufficient opportunity to struggle naturally within the egg, it may not withdraw the yolk sac fully. It was found that farmers experiencing this problem were, indeed hatching nearly all chicks "by hand", a process involving assisting the chick out of the shell soon after "pipping". Some eggs were opened before pipping commenced. The hatching assistance given on problem farms was completed very quickly (approximately 15 minutes), while the membranes and blood vessels were still wet and active. Other farms which practiced assistance, but which experienced a low incidence of the problem, manually hatched their chicks over a period of one and a half days. This extra time could have been expected to give the chick ample opportunity to fully absorb its yolk sac.

Mortality at hatching

Eggs of all breeding pairs were associated with some chick losses at hatching, the incidence ranging from two to seventeen percent. Most chicks that died at hatching were weak. There were very few suggestions as to possible causes.

Post hatching leg deformities

Limited records were obtained on the incidence of leg problems (the most common post-hatching deformity in chicks) with the highest incidence being only four percent among the recorded breeding pairs. This deformity was not specifically sought in the survey, but discussion with farmers showed the problem to be of great concern. Deformities of the long bones of hand-reared chicks have been suggested to be of nutritional origin. The conditions are variously known as perosis, slipped-tendon, bow-leg, bent-leg and straddle-leg. Suggested causes include overfeeding and consequent excessive growth (Gandini et al 1986; Stewart 1989); overfeeding or deficiencies of calcium, phosphorus and vitamin D3 (Gandini et al 1986); deficiency of vitamin E or selenium (Dolensek and Bruning 1978; Van Heerden et al 1983); deficiency of methionine or choline (Flieg 1973); and deficiency of zinc or manganese (Gandini et al 1986; Stewart 1989). Stewart (1989) suggests that a decline in protein intake and increased exercise can cure the problem if it is detected early. One farmer claimed to have solved the problem with Vitamin E supplementation, administered in the drinking water at a concentration estimated to give a daily intake of 30mg/kg body weight.

Despite the low incidence measured in the study, deformities of the long bones are perceived to be a widespread problem in the industry and further investigations into their causes are warranted.

Chick deaths under three months of age

Chick deaths in this category are those that occurred suddenly, without any obvious symptoms. Leg problems and impaction apparently account for most losses in this period. Most farmers suspected that long grass was the cause of impaction, and thus regularly mowed the pens. Sand, straw, wilted greens and foreign bodies have also been found to cause impaction (Peters 1989; Reddacliff 1981; Smit 1963; Pulling 1976).

Survey conclusions

It was evident that the major areas for future research were egg infertility, embryonic death, post hatching leg deformities in chicks and the effects of selective breeding and inbreeding on survival rate. The nutrition of breeding birds and chicks is probably of fundamental importance to all parameters of reproductive efficiency and growth. Incubation techniques and equipment too, were found to be frequently inadequate, and hence further investigations in this area are warranted (J. Stewart, pers. comm. 1991).

THE ECONOMIC SITUATION

The industry is in the "breeding up" phase, and hence very high prices are currently being paid for birds. Breeding pairs sell for approximately \$60,000. The best three breeding pairs among those surveyed are producing a commercially viable number of chicks valued at either breeding or slaughter prices. At the current Australian price of \$4,500 for a three month old chick, these breeding pairs are currently yielding an annual gross income of \$135,000 per pair. Slaughter prices in South Africa presently average \$500 for a 12-14 month old bird and at this price, gross income is \$15,000 per pair per year.

Current products of the South African ostrich industry are leather, meat and feathers, which represent 75%, 15% and 10% respectively, of total farm income. Approximately 1.3 m² of leather is produced by a 12-14 month old bird and this currently sells at approximately \$US32 per 0.1 m² (R. Elliott, pers. comm. 1991). The Klien Karoo cooperative in Oudtshoorn provides 97-98% of ostrich hides on the world market. In 1989 60,000 were marketed but the number dropped to 45,000 in 1990. J. Stewart (pers. comm. 1991) suggests that this drop in production was the result of bad seasonal conditions. He also estimates that the price for hides would not fall while production remained below 200,000 per year.

Six to ten kg of prime meat is produced per 12-14 month old bird and is mainly used in restaurants, the remainder being used for products such as biltong (R. Elliott, pers. comm. 1991). There are four wholesalers in Europe who import approximately 350 tons of ostrich meat for the restaurant trade and they estimate that the trade could absorb five times this quantity. The cost of ostrich meat

depends upon the cut and ranges from \$14-27 per kg. Other markets such as America, Asia and Australia are totally untouched (J. Stewart, pers. comm. 1991).

Ostrich feathers are used for feather dusters, feather fans, capes, boas and stoles (Osterhoff 1979; Anon 1989). In 1959 the Klein Karoo Agricultural Co-operative gained statutory control over most ostrich products in South Africa, including marketing. The feather processing rights were acquired in 1980. This brought feather auctions to an end, and Klein Karoo became directly involved in the marketing of ostrich feathers on a world wide basis. The volume of feathers handled by the co-operative in 1989 was approximately 150,000 /kg (Anon 1989). The price of feathers is dependent upon quality, with the best Oudtshoorn birds yielding approximately \$150 worth of feathers per bird per year. Most of the birds in America and Australia would yield only \$20-40 worth of feathers per bird (J. Stewart, pers comm. 1991).

FUTURE PROSPECTS

There are presently only small numbers of birds within Australia and these are descendants of those imported around the turn of the century. Due to current quarantine regulations and facilities, birds cannot be imported, hence growth of the industry is dependent upon existing stock. This will extend the time necessary to breed sufficient numbers of birds to form a viable commercial industry. R. Elliott (pers. comm. 1991) estimates this stage may be reached by 1997. The effects of the limited genetic base on population growth is not known at present but it could have implications for reproductive efficiency.

At the present time the birds have a very wide geographical distribution. This is not currently a problem but may become one if the industry aims to integrate its functions. If, for example, it proves desirable to develop a fully specialised processing facility for ostrich products, it would then be necessary for the industry to be **centred** in a smaller area to reduce transport costs and to increase efficiency. The exact location rests on environmental issues and cannot be decided until studies on climatological requirements for successful breeding of ostriches have been made. At this stage production levels in different climatic areas are similar, but bird numbers are small and practices vary greatly between farms, making comparisons extremely difficult.

CONCLUSIONS

It will be some time before the Australian Ostrich Industry becomes fully commercial. The problems identified in production such as egg infertility, embryonic mortality and post hatching leg deformities must be dealt with while bird prices are high and there are resources to fund research.

Much also needs to be done to develop a viable secondary industry. Issues such as quality control, processing requirements and facilities, **centralisation**, market research and an industry plan for the future **all** require definition and development.

The Australian Ostrich industry has a great deal of potential to become a substantial export industry for Australia. Its success is going to depend upon solving some of its present problems and developing substantial guidelines for future growth. It is important to have a central organisation to co-ordinate these developments.

ACKNOWLEDGEMENTS

I would like to thank Richard Elliott of Export Aid and Jim Stewart for providing valuable information and opinions about the ostrich industry. The information that was provided **by** farmers was an essential contribution in this study and I would like to thank them **very** much for all of their time and patience. I would also like to thank David Farrell and John Thwaites for all of their assistance, guidance and enthusiasm during this study and Merv Hill for his valuable comments during the preparation of this paper.

REFERENCES

- ANON, (1873). "Report on the Ostriches". Zoological and Acclimatisation Society paper. Melbourne.
- ANON, (1989). Report on Ostrich Farming. Circulated by The Klein Karoo Agricultural Co-operative, South Africa.
- DOLENSEK, E. and BRUNING, D. (1978). Ratites In: "Zoo and Wild Animal Medicine", pp.167-180 (Saunders, Philadelphia).
- DOUGHTY, R. (1973). Agricultural History. **46**:133-145.
- DOUGLASS, A. (1881). "Ostrich Farming in South Africa" (Cassell, Petter and Galpin, London).
- GANDINI, G.C.M., BURROUGHS, R.E.J. and EBEDES, H. (1986). Journal of the South African Veterinary Association. **57**:39-42.
- HERBERT, T. J. (1913). @cultural Gazette of N.S.W., **2**: 511-521.
- HERMES, J.C. (1989a). The Ostrich News Annual, 2nd Edn. pp. 220-222 (The Ostrich News Inc, Oklahoma).
- HERMES, J.C. (1989b). The Ostrich News Annual, 2nd Edn. pp. 249-251 (The Ostrich News Inc, Oklahoma).
- IWANICKI, I. (1985). Journal of Australian Studies, **16**:42-50.
- MOSENTHAL, J. and HARTING, J. E. (1877). "Ostriches and Ostrich Farming" (Trubner & Co, London).
- OSTERHOFF, D. R. (1979). World Review of Animal Production, **15** (2) :19-30.
- PETERS, L.J. (1989). The Ostrich News Annual, 2nd Edn. pp. 99-102 (The Ostrich News Inc, Oklahoma)
- PULLING, F.B., (1976). Journal of Zoo Animal Medicine, **7**: 35.
- REDDACLIFF, G. L. (1981). Veterinarians Proceedings **55**:16-20.
- SMIT, D. J. v. Z. (1963). "Ostrich Farming in The Little Karoo".(Heer Printing Co. (Pty.) Ltd., Pretoria).
- STEWART, J. S. (1989). Husbandry and Medical Management of Ostriches: part 2. Proceedings of the American Association Zoo Veterinary, Greensboro: 119-122.
- VAN HEERDEN, J., HAYES, S.C. and WILLIAMS, M.C. (1983). Journal of the South African Veterinary Association, March : 53-54.