Opportunities In Managing Closed Herds

—Dave Raynolds

There is still a surprising amount of superstition surrounding the management of closed animal herds. What happens if the same blood lines are continued for a long period? Is this better or worse than bringing in new blood? Or just different? Some examples from closed herds can throw some light on this controversial subject.

Early in this century, many feared inbreeding or line breeding. They cited poor results in some animal populations, and were particularly influenced by small isolated human populations in which incest aggravated physical and mental disorders. One standard calculation proposed that several hundred unrelated individuals were needed to maintain an adequate genetic pool. Present-day buffalo in the United States are probably descended from a smaller number of unrelated individuals alive a century ago.

Careful studies in zoos suggest that skillful breeding can produce good results from only a few individuals. In a current case, four original Speke's gazelles have produced six generations over 15 years with animals that appear sound. A Science News report (SN: Vol. 126, Nos. 15, 16, Oct. 13 and 20, 1984, reported by Julie Ann Miller) indicates that there were some early deaths in the first generations. It is believed that the original four individuals possessed most of the genetic diversity of their species.

A specific buffalo example involves one of the efforts to preserve the European wisent (Bison binasus bonasus). As noted in an article by Hans-J. Schroder (Buffalo! Vol. 12, No. 4, July-August 1984, p. 15), a breeding operation near Hanover, West Germany started in 1928 with one wisent bull and three American buffalo cows (Bison bison bison). The *Report of the Americaon Bison Society* for 1927-1928-1929-1930 reports (p. 59) Hannover holding three cross-bred cows from Antwerp, Berlin and Stellingen, each of these resulting from a male wisent-female buffalo cross. The *Report* also notes two calves (3/4 wisent) from the bull and cross-bred cows. In time, the buffalo blood was bred out, producing 167 wisent by 1982 as reported by Schroder.

Actual experience is compared with the old theory in the simplified chart. The chart is constructed on a semi-logarithmic scale, so that a natural rate of increase will show as an ascending straight line. The old theory supposed that inbreeding would increase total numbers at first, but then lead to a population crash—perhaps no individuals at all, or just a few sterile survivors. Actual experience suggests some early deaths are possible as the small rate of increase will take over. Finally herd size will be limited by available food and space.

Animals in closed herds will not show the full range of extreme variations in their species. There are a number of factors which account for this. A single closed herd in one site has only that specific environment to cope with—not as diverse as the range of the whole species. Animals within the herd will tend to share dominant group breeding preferences. If the herd is managed by people, there will be conscious and unconscious breeding, medication, culling and sales decisions which tend toward herd uniformity. A recent example in cattle is the development of the Beefmaster breed, started in Colorado.

Open herds, which regularly accept new breeding stock, are kept "open" for the sake of genetic improvement with new blood, and for economic reasons if mature animals are marketed and young replacement animals purchased. Managers of an open herd can buy from other open herds or from closed herds. If the objective is upgrading a present herd, stock from a closed herd may be preferable because the similar appearance of animals in a closed herd gives a good indication of what its blood lines produce.

An ideal location for a closed herd would be an island, and NBA members saw an outstanding example managed by Doug Propst of the Santa Catalina Island Conservancy during the Spring 1981 meeting on Santa Catalina Island off Los Angeles. Eleven original plains buffalo were brought there in 1924 for the filming of a Zane Grey Western. They declined to leave after becoming movie stars. The herd was augmented with 14 animals from the Sherwin herd in Logan, Colo., in 1934 (probably also the source of the original animals). Presumably because of the environment (warm climate and mountainous terrain) the size of individual animals declined after many generations. New blood was introduced with 15 bull calves from the Durham (Gillette, Wyo.) herd in 1969 and 7 bull calves from the Moiese, Montana, National Bison Range in 1970. When observed in 1981 the roughly 400 animals were light, wirey, and well-adapted to their location. While there were three introductions of new stock in 60 years, essentially this has been a closed herd most of the time.

Another successful closed herd was established south of Gillette, Wyoming, in 1922 by R.B. "Ted" Marquiss, who bought a young pair from Scotty Philip of Ft. Pierre, S.D. The herd, now managed by Ted's daughter-in-law Toots Marquiss and grandson Gary, has stabilized at 75. Earlier, when at a level of over 500, it provided stock for what is now the Durham ranch, run by NBA President Armando Flocchini. As noted above, Durham in turn provided animals to Catalina. (Readers may recall that both Scotty Philip and Toots Marquiss are members of the National Buffalo Hall of Fame.)

Government-owned closed herds have had mixed results. The disease problems of the Yellowstone Park herd and the Woods Buffalo Park herd (Canada) are untreated. In contrast, the Moises National Bison Range herd in Montana is healthy and actively managed by Jon Malcom. The well-managed Custer State Park herd in South Dakota is probably not completely closed, due to crossing with the adjoining relatively unmanaged federal herd in Wind Cave National Park.

NBA managers of closed herds, including the author, generally sell live animals for breeding purposes, and cull vigorously. In this way favorable herd characteristics can be encouraged, and weakness weeded out. Whether this is better or worse than the "open" herd technique probably depends on individual owner preferences and objectives. Since I am trying to concentrate and preserve the Mountain Buffalo bloodline (Bison bison wyomingensis), a closed herd is the logical way to approach that objective. Periodic culling of smaller and lighter-colored animals results in a larger, darker herd.

CHART: Closed Herd Breeding