

New book: *Biology of Mongolian Pastoral Livestock and Characteristics of Nomadic Animal Husbandry* by O. Shagdarsuren, 2005, 304 pages, ISBN none, the National University of Mongolia Press, paperback, MNT 7000.

Besides the foreword, conclusion and references, this book has nine chapters: Review of early literature sources on Mongolian pastoral livestock husbandry; Similarities and differences between sedentary (farming) and pastoral animal husbandries; Natural selection and pastoral livestock husbandry; The origin and population biology of Mongolian domestic animals; Environmental factors and Mongolian domestic animals; Four seasons of the year and the ecology of Mongolian pastoral livestock; Nomadic lifestyle as a basis for the existence of pastoral livestock husbandry; Practical approaches of Mongolians for selection of pastoral livestock; and Economic aspects of Mongolian pastoral livestock husbandry.

This is not the first or the last book to discuss various aspects of livestock husbandry in Mongolia: there have been several other comprehensive works (for example, Shagdarsuren, 1980; Tumurjav, 1989; Erdenetsogt, 1998; Tumurjav 2004.). However, we must credit Prof. Shagdarsuren for his efforts in making the study of Mongolian pastoral animals a subject of modern biological research. We as Mongolians all have roots in the nomadic lifestyle and we applaud Dr. Shagdarsuren for persistence in pursuing the subject matter. Pastoralism is a by-product of seasonality and low productivity and its effect on animal husbandry practice is profound. The biggest achievement of this book is to look at every aspect of Mongolian livestock husbandry from the viewpoint of population biology. Wide-ranging aspects of domestic animal husbandry are examined from ecological, evolutionary biological and even economical points of view. The book has thrown out many ideas as the author has attempted to elucidate his acute observations of everyday practices in Mongolian livestock husbandry using concepts from theoretical population biology. The author also noted that some of these ways (such as pasture use before and after collectivization [establishment of centrally planned collective farms during the socialist period], structure of herds, selection for and against certain traits etc.) have been lost due to socio-economic or political changes in the country and suggested ways to improve the current situation. There are many interesting observations: for example, Mongolian herders usually choose future sires for their herds even before animals reach

sexual maturity (i.e. before they exhibit secondary sexual characteristics). This is just one example of the author's intimate knowledge of livestock practices in Mongolia.

Despite these achievements, there are some issues with the book. First of all, there are numerous typographical errors. Secondly, there is a conspicuous lack of real, scientifically tested, data to support many of the claims made by the author. Generally, only after several stages of the research process, can ideas be either supported or rejected and claims made by a researcher tested as valid (or not). This book has many ideas, but essentially none of them were confronted with real data.

The author has made some questionable claims. For example, in illustrating differences between sedentary and pastoral farming practices, the author speculated that artificial selection in sedentary animal husbandry acts against natural selection, whereas it acts in the same direction as natural selection in pastoral livestock husbandry. This may be true to a certain extent but we have a couple of reservations with this claim. First, natural selection does operate even in the most artificial environments. That is to say that an artificial environment is not absolutely free from natural selection as long as there is fitness variance among individuals, as opposed to what the author argues. It is true that farm animals are highly dependent on the farm conditions. However, it should not be assumed that the farm animals are kept in a completely isolated artificial environment, such that natural selection cannot act on them. Secondly, natural selection is not a static force, but in fact a dynamic process with no clear end point. In other words, its direction always varies due to changes in biotic and abiotic environments. Therefore, it is superficial to conclude that artificial selection in the case of Mongolian domestic animals is always in the same direction as natural selection. It is true that Mongolians eliminate weak animals from reproduction, but that is also the case for sedentary animal husbandry. Our guess is that artificial selection is employed only for one or several traits in the case of sedentary farm animals (for example, for milk production or meat production or fat production etc.), whereas it selects for many traits simultaneously in the case of Mongolia (i.e. the animal has to be "vigorous"

to be selected for). However, in our opinion natural selection can act either for or against this artificial selection in both cases.

The author claims that the vigor of Mongolian domestic animals has a genetically determined ratio of approximately 25:50:25 for vigorous, average and weak animals (p. 254). This is basic Mendelian genetics and the ratio is in accordance with the Hardy-Weinberg equilibrium for a one-locus, two-allele case where allele frequencies are equal. Since there is no actual data to support this claim, it strikes us as an oversimplification: it is rather hard for us to believe that “vigor” of animals which must be a quantitative genetic trait (i.e. continuous trait) follows such a simple segregation rule, however it may be measured. For all five types of domestic animals considered, at that. Even if this “trait” segregates according to this ratio, why has not selection against weak animals over many generations resulted in a change of the ratio? Instead, there could have been easy yet important quantitative genetic research by keeping records of mid-parent values and offspring values of some traits. This would enable a narrow sense heritability for these traits to be estimated via regression analysis, and to look at the response of traits to selection. This has been done time and again in many countries for many types of farm animals.

It should be said again that the author has put forth many ideas in his book that are interesting research topics in their own right, when tested appropriately. This is the true value of this book. Almost all the ideas need to be tested through scientific research, which would be truly interesting and valuable to modern science. It would also be interesting to compare pastoralism in Mongolia with pastoralism in different parts of the world. We agree with the author that Mongolian pastoral livestock are unique, but this uniqueness can only be seen in real data and appropriate statistical comparisons. Many other

interesting questions regarding pastoral livestock can and should be asked, not only by the biologically-minded but also mathematicians, economists, and social scientists. We hope that researchers will consider Shagdarsuren’s thoughts in future studies, and confront some questions with real data.

References:

- Erdenetsogt, N. 1998. *Nomadic Livestock Husbandry of Mongolia*. Urlakh Erdem Press, Ulaanbaatar, Mongolia. pp. 302. [in Mongolian]
- Shagdarsuren, O. 1980. *Pastoral Animal Husbandry and Some Aspects of Theoretical Biology*. Ulaanbaatar, Mongolia. pp.158. [in Mongolian]
- Tumurjav, M. 1989. *Pastoral Livestock in Mongolia*. State Press, Ulaanbaatar, Mongolia. pp. 398. [in Mongolian with English summary]
- Tumurjav, M. 2004. *Tradition, Innovation and Intensification of Mongolian Pastoral Livestock Husbandry*. Olonlog Press, Ulaanbaatar, Mongolia. pp. 432. [in Mongolian]

Bazartseren Boldgiv

Ecology Department, National University of Mongolia, Ulaanbaatar 210646, Mongolia
Present address: Department of Biology, University of Pennsylvania, Philadelphia, PA 19104-4207, USA, Email: boldgiv@sas.upenn.edu

Badamdorj Bayartogtokh

Zoology Department, Faculty of Biology, National University of Mongolia, Ulaanbaatar 210646, Mongolia, Email: bayartogtokh@num.edu.mn

Khayankhirvaa Terbish

Ecology Department, Faculty of Biology, National University of Mongolia, Ulaanbaatar 210646, Mongolia, Email: terbish52@magicnet.mn