

# Commission on Nomadic Peoples

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Parameters in North Western Afghanistan”

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SOME PROBABLE EFFECTS OF DROUGHT ON FLOCK STRUCTURE AND  
PRODUCTION PARAMETERS IN NORTH WESTERN AFGHANISTAN

by N.T. Clark

Introduction

The effect of a major disaster on herd composition and herd growth has been discussed by Dahl and Hjort (1976). They considered the likely effect of a hypothetical drought on cattle and camel herds but did not study the effect of a disaster on sheep or goats.

Between 1974 and 1977 the author worked in North Western Afghanistan (Herat) and in 1974 conducted a survey among migrating nomads. A much more detailed study was undertaken by the late Ian Mc Arthur in 1975 among both sedentary and transhumant pastoralists. These surveys were conducted shortly after a major drought (1972). Drought losses were estimated at seventy percent. The data collected between 1974 and 1977 and information obtained through interview and contact with pastoralists and officials, indicated a three phase cyclical production pattern, governed by the periodic drought. High mortalities occur during the drought and this is followed by a rapid recovery phase of approximately five years during which low numbers of livestock understock the range and unit production levels are high. This recovery phase leads into the plateau period when stock numbers are high (and probably self limiting), the plane of nutrition is relatively low and unit production levels are low. This phase may last for about five years (if the drought occurs on average every ten years) and is terminated by the next major drought. The next recovery phase then follows.

The drought in North Western Afghanistan occurs when the single Winter wet season fails. This coincides with the lowest annual body condition (declining since mid summer) and the period of greatest animal requirement (parturition and early lactation). This becomes disastrous if stock numbers have been high for a number of years resulting in limited residual forage, low liveweight and low body reserves.

This paper discusses the effect of the drought on flock growth and flock parameters. It should be considered as a hypothetical study as many of the assumptions for the drought and plateau periods are unsubstantiated and are based on comments made by officials' and pastoralists describing previous years. Some of these comments may have been exaggerated, for example drought mortalities and mortality of lambs during the plateau period. Allowance was made for likely bias. Some other assumptions are pure guesses, such as milk yield during the drought. The assumptions for the recovery period are based on field observations during the 1974/77 recovery phase and are probably more reliable.

Results and Discussion

1. Total flock liveweight declines by about seventy percent in the drought year and at the end of the first post drought year it recovers

to fifty percent of the pre drought level. By the end of the second post drought year, flock liveweight recovers to seventy-five percent of the pre drought level and by the end of the fourth post drought year total liveweight (and presumably grazing pressure) virtually reaches pre drought levels. The range land is thus lightly grazed (biomass) for three years (drought year, and post drought years one and two) but only in the last two of these years is rainfall adequate to allow range land production to greatly outstrip consumption.

2. By the end of the fifth year post drought, total flock numbers recover to about pre drought levels.

3. Ewe numbers recover more slowly than either total flock numbers or than total flock liveweight and it takes until the end of the sixth post drought year for ewe numbers to reach ninety percent of pre drought levels.

4. The above three points show that ewe numbers do not adequately reflect the changes in flock numbers or in the biomass grazing pressure. Flock liveweight is probably a more meaningful parameter.

5. Based on the assumptions used, total milk production is only reduced in the year of the drought. Much higher unit production levels in the first and second year post drought compensates for the reduced numbers.

6. Sales of male sheep increase rapidly so that during the third year after the drought they reach pre drought levels. This is due to the higher plane of nutrition allowing the male/castrate sheep to grow faster and reach marketable age a year earlier i.e. at eighteen months instead of thirty months. For the first three years after a drought the level of sales and urban consumption are depressed and pastoralists income is reduced. If the drought disaster occurs every ten years then supply will be inadequate for three out of ten years. This has an obvious effect on the viability of marketing infrastructure and should be considered when planning marketing and meat processing interventions.

7. The total amount of meat and milk available for self consumption (by the pastoralist) is vastly reduced for two years although milk production is adequate in the second year after the drought. By the end of the third year, sheep sales, milk production, pastoralist consumption have reached pre drought levels.

This relatively short period of food deficiency after a major drought is less than expected.

8. Very few ewes are available for sale. Ewes are mostly required for flock build up or maintenance purposes. The ewes that are sold are either old, diseased, barren or deformed. There are some exceptions. For instance the shepherds receive ten percent of lambs weaned as part payment for their services. These are mostly retained to build up a shepherd's personal flock but they are sometimes sold. The model shows that during the plateau period (pre drought) only about six ewes will be sold annually from a flock of one hundred and fifty ewes. If the period between droughts is ten years then cull female sales average three per year, that is two percent per year. This is a rational action and attempts

to increase sales of females are probably irrational, under the circumstances.

9. The model indicates that taking coefficients from one part of the cycle can be highly misleading. This should be taken into account when collecting and analyzing data from a pastoral situation. Attention is often directed to a pastoral society during a disaster and the coefficients pertaining at that time are often assumed to be average. This is misleading.

10. The time taken for female numbers to recover to pre drought levels is approximately eight years. This can be compared with estimates by Dahl and Hjort (1976) of thirty years for cattle and about double this for camels. The figures are not strictly comparable but they do indicate a faster recovery of small stock (sheep and goats). This is a good reason for pastoralists retaining mixed types of animals. The models of Dahl and Hjort may underestimate the compensating effect of high production coefficient during the recovery phase of the cycle and I believe that they have overestimated the recovery time. Also as pointed out in point four of this paper female numbers may not be the best indicator of flock and herd biomass, total flock or herd grazing pressures, or of total production.

11. The cyclical pattern differs from those demonstrated in Hjort's 1982 paper. The decline in stock numbers is more precipitous and the recovery in stock numbers is more rapid. There is then a plateau period of high stock numbers and grazing pressure until the next drought decimates the flock. Dahl and Hjort may underestimate the higher production parameters in the recovery phase. The cycle is approximately one year drought, four to five years recovery phase and four to five years plateau phase. The phases are not discreet but overlap and there are seasonal variations. During the plateau phase the animal demand/pasture supply relationship is in approximate balance. The livestock numbers are controlled by the quantity and quality of feed affecting mortalities and reproduction rates. The rangeland suffers short term decline in productivity and condition but in North Western Afghanistan this does not appear to be irreversible. Vegetative recovery is probably faster in this area than indicated in Hjort's (1982) figure three. The perennial species (mostly *Artemesia alba*) probably take two years to fully recover but the important annuals are highly productive in the spring, twelve months after the drought.

Irreversible degradation is likely to occur in other areas when:

- a) the human population pressure is constantly high;
- b) the climate is erratic;
- c) the vegetation is unable to withstand a constantly high grazing pressure; and
- d) the animal species grazing the range is less affected by and can recover quickly from droughts, e.g. goats and sheep.

12. The results have the following significance

- a) parameters vary throughout the cycle and this affects the length and intensity of the recovery period. People analysing flock structures and compiling flock projections should be aware of the cyclical pattern;

- b) for three years out of every ten there is likely to be a shortage of sale animals and this will affect urban consumption levels and the viability of marketing and meat processing facilities. For instance expensive slaughter houses may not be viable if they close for three out of every ten years;
- c) only about two percent of the breeding flock is sold each year which makes it difficult to purchase ewes and establish new breeding flocks;
- d) the production system appears to be resilient and well adapted to the harsh environment. Interventions should be carefully assessed as disrupting the socio/eco-system balance could have deleterious side effects;
- e) the home consumption of the pastoralists is only drastically reduced during the drought year and is reduced to a lesser extent in the following year. This could mean that in this situation a large drought relief effort is desirable for one year but that the requirement for assistance should decline in the second year.

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Table 1 HYPOTHETICAL SHEEP FLOCK MODEL (North West Afghanistan)

	Pre Drought	Drought Year	POST DROUGHT							Pre Drought
			Year	Year	Year	Year	Year	Year	Year	
			1	2	3	4	5	6	7	
Two year old Ewes	28	16	6	20	20	32	33	30	27	28
Three year old ewes	25	11	15	6	19	19	29	29	26	25
Four year old ewes	22	10	11	14	6	18	17	26	26	22
Five year old ewes	19	9	10	10	13	6	16	15	23	19
Six year old ewes	17	4	9	9	9	12	5	14	13	17
Seven year old ewes	15	0	4	9	8	9	11	5	12	15
Eight year old ewes	13	0	0	4	8	8	8	10	5	13
Nine year old ewes	11	0	0	0	3	7	7	7	9	11
Total number of ewes	150	50	55	72	86	111	126	136	141	150
Lambs weaned	98	15	50	79	86	94	94	95	92	98
Number yealing females	32	6	21	33	34	35	33	31	30	32
Number yealing males	32	7	21	34	34	35	33	31	30	32
Yealing males sold	0	0	6	20	32	24	14	0	0	0
Yealing males die	4	16	0	0	2	1	2	3	4	4
Two year old males	28	16	0	0	0	9	19	29	27	28
Total Flock Number	242	79	103	139	154	190	211	227	228	242
Total Flock Weight (Kg)	7110	2000	3735	5285	5910	6737	7100	7061	6700	7110
Total Milk Production	2450	150	3000	4320	4300	3760	2820	2375	2300	2450
Total number sold	33	16	6	20	34	37	37	33	32	33

Table 2 HYPOTHETICAL SHEEP FLOCK MODEL (North West Afghanistan)

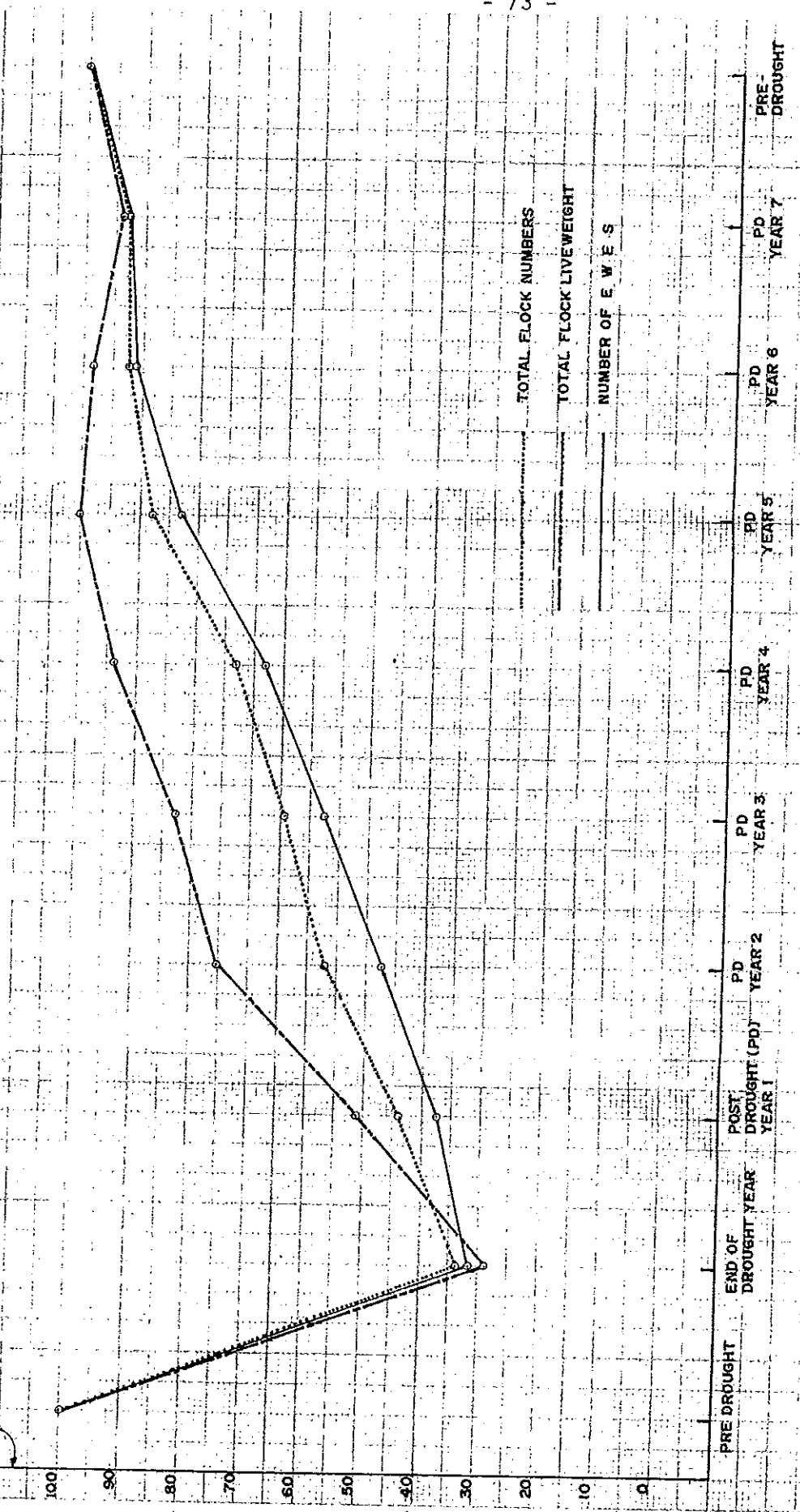
Assumptions Used

	Pre Drought	Drought Year	POST DROUGHT							Pre Drought
			Year	Year	Year	Year	Year	Year	Year	
			1	2	3	4	5	6	7	
MORTALITIES										
Adults	12	66	2	5	5	7	10	12	12	12
Old Ewes (10+)	50	100	-	-	50	50	50	50	50	50
Lambs	25	70	5	5	10	15	20	25	25	25
Yealings	12	50	5	5	5	10	10	12	12	12
PERCENT LAMBS Weaned	65	30	90	110	100	85	75	65	65	65
Ewe weight (kg)	30	25	40	40	40	37	35	32	30	30
Yealing weight (kg)	20	15	30	30	30	27	25	22	20	20
Two year old weight (kg)	30	30	30	-	-	-	30	30	30	30
Milk yield per lactation (kg)	25	10	60	60	50	40	35	30	25	25
Percentage of yealing males sold	0	0	100	100	100	80	50	20	0	0

FIGURE I.

EFFECT OF DROUGHT ON TOTAL FLOCK NUMBERS,  
TOTAL FLOCK LIVEWEIGHT AND TOTAL E W E NUMBERS

% OF  
MAX. NUMBERS



TOTAL FLOCK NUMBERS

TOTAL FLOCK LIVEWEIGHT

NUMBER OF E W E S



FIGURE 2: HYPOTHETICAL EFFECT OF DROUGHT ON THE NUMBER OF LAMBS WEANED, SHEEP SOLD AND MILK PRODUCTION. (North West Afghanistan)

