

TOPIC 1. OVERPOPULATION EFFECTS

Overpopulation, or the exceeding of the carrying capacity of a range, has definite ecological effects on both animals and range. One of the most obvious effects is malnutrition and death of animals. Less obvious effects of overpopulation appear earlier than death, but are much more subtle and more difficult to recognize. More or less regular contact is needed over a period of several years if changes are to be recognized as a result of increasing populations. Further, it is necessary to know the signs to look for on the range.

The first UNIT in this TOPIC includes examples and references pertaining to malnutrition as a result of over population. Effects may be as obvious as death from starvation, or as subtle as a slight drop in reproductive rates.

The second UNIT includes examples and references pertaining to excessive competition between herbivores. Note the emphasis on excessive. Different species of ruminants may coexist on the same area because of differences in food habits, behavior, etc. (see PART II, CHAPTER 5).

The third UNIT includes examples of range responses to improper use. These three UNITS are examples of effects, of what happens as a result of overpopulation of large animals such as wild ruminants. The next TOPIC includes discussions and references on the causes of overpopulation.

UNIT 1.1: MALNUTRITION

Malnutrition is a common characteristic of the youngest age classes in many populations of wild ruminants. Why? Because they simply have not lived long enough to grow large enough to put away body reserves to carry them through rough times. They are like small businessmen with little capital, often barely hanging on, and the first to succumb when the financial environment becomes unfavorable.

Because of the age effect discussed above, malnutrition must be considered natural in the sense that some animals--late-born fawns, for example--are "born losers," almost certain to die even in a typical winter. Such deaths should not be attributed to poor range conditions. It may be that fawns born in July or August, conceived in December or January, were the offspring of year-old dams who not only conceived late, but may also have been low milk producers as well as inexperienced mothers.

In the natural world, such a set of circumstances almost inevitably results in malnutrition and subsequent death.

It may be that the range has ample forage, but excessive snow limits the animals' mobility, confining a herd to an unusually small area for a long time. Is the resulting malnutrition the result of mismanagement and overpopulation? Not necessarily so.

The question is often asked ". . .why don't we feed the excess deer? The answer is simple . . .cost . . ." (Severinghaus 1975). How much does it cost to feed a group of wild ruminants? The basic calculations of metabolic requirements have been made previously (Ecological Metabolism in CHAPTER 7, UNIT 6.1); it is necessary here to simply format our knowledge into an appropriate framework for a cost analysis. This is done in WORKSHEET 1.1a.

What are the symptoms of malnutrition in wild ruminants? It is important to realize that a weight fluctuation from an autumn high to a late winter low is a natural cyclic phenomenon (see Moen and Severinghaus 1981; also PART I, CHAPTER 1, UNIT 1.4). Malnutrition becomes a serious problem to the individual when an animal approaches too closely or reaches the weight of no return.

What are the symptoms of malnutrition? The fat deposits, accumulated during the summer and fall, are depleted in a natural sequence. First, fat between the hide and musculature disappears. This happens every year, and is part of the normal weight loss. Second, fat inside the body cavity disappears. This too is normal, up to a point. When these reserves are nearly depleted, there is little fat left to mobilize. Then, bone marrow fat and other deposits not easily observed are mobilized, and malnutrition is present. The sequence is not perfect nor clearly evident in all cases, as pointed out by Ransom (1965).

Chronic malnutrition results in depressed growth rates and high levels of mortality. There are numerous published papers on the subject as results of dead deer counts have been used to document the need for herd control.

LITERATURE CITED

- Ransom, A. B. 1965. Kidney and marrow fat as indicators of white-tailed deer condition. J. Wildl. Manage. 29(2):397-398).
- Severinghaus, C. W. 1975. Advances in the science of deer management. The Conservationist 29(4):18-20.

REFERENCES, UNIT 1.1

MALNUTRITION

SERIALS

CODEN	VO-NU	BEP	ANIM	KEY WORDS	AUTHORS	YEAR
AMFOA	51--1	13	15	od-- killing deer by kindness	carhart,ah	1945
AUMGA	47--2	74	79	od-- deer trouble, overpopulatn	cook,db	1945
JWMAA	2---1	1	2	od-- prevntng deer concentratns	cox,wt	1938
JWMAA	3---4	295	306	od-- n yellwstn wint rang studi	grimm,rl	1939
NAWLA	7---1	46	47	od-- feeding deer to death	giles,rh,jr; mcki	1968
NAWTA	8----	333	337	od-- fallacies in winter feedng	carhart,ah	1943
NAWTA	9----	167	172	od-- murderers creek herd, oreg	mitchell,ge	1944

CODEN	VO-NU	BEP	ANIM	KEY WORDS	AUTHORS	YEAR
AMFOA	42-10	463	465	odvi starv, n mich winter kill	east,b	1936
ANKIA	62--4	106	110	odvi our white-tail deer problm	stenlund,m	1959
CNSVA	2---4	21	21	odvi winter deer feeding	darrow,rw	1948
CNSVA	3---5	19	22	odvi bone marrow index, malnutr	cheatum,el	1949
CNSVA	10--1	39	39	odvi winter deer kill, 1954-55	n y conserva dept	1955
CNSVA	10--6	2	4	odvi too many deer	cheatum,el	1956
CNSVA	19--3	8	9	odvi winter deer feeding	hesselton,wt	1964
CNSVA	29--4	18	20	odvi advances, science of mngmt	severinghaus,cw	1975
JWMAA	9---4	319	322	odvi symptoms of malnutrition	harris,d	1945
JWMAA	14--2	156	161	odvi histopath chng, starv,wisc	rausch,r	1950
JWMAA	21--2	245	247	odvi marsh deer die-off in loui	glasgow,ll; ensmi	1957
JWMAA	29--2	397	398	odvi kidney, marrow fat, indica	ransom,ab	1965
JWMAA	39--4	813	814	odvi wint field test,food block	anderson,rh; you/	1975
NAWTA	4----	268	274	odvi results, feeding exp, mich	davenport,la	1939
PCGFA	20----	134	137	odvi mandib cav tiss,indic cond	baker,mf; lueth,f	1966
PCGFA	21----	15	23	odvi eff ovrrpop, huntng,ft knox	dechert,ja	1967
WSCBA	2---9	3	9	odvi to citizens of wisconsin	mackenzie,hw	1937
WSCBA	7---9	8	10	odvi famine stalks the deer,wis	feeny,ws	1942
WSCBA	13-12	22	22	odvi too many deer, pennsylvani	anonymous	1948
WSCBA	14---	18	19	odvi deer starve at feedi statn	stollberg,bp	1949

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	8---	4	317	338	odhe supplmntl wint feedng, uta domen,er; rasmuss		1944
JWMAA	29--	2	352	365	odhe stomach cont, conditn, n m anderson,ae; sny/		1965
JWMAA	36--	2	579	594	odhe indices of carcas fat, col anderson,ae; med/		1972
JWMAA	38--	4	815	822	odhe eff starvatn, rumen bacter decalesta,ds; na/		1974
NAWTA	14---		502	512	odhe problm areas,westrn states aldous,cm		1949
PMASA	19...		72	79	odhe annual cycle conditn, mont taber,rd; white,/		1959

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	8---	1	1	6	ceel private game pres,ovrstock dalke,pd; spencer		1944
NEJZA	26--	3	448	ceel ecolo, wint feedng, sctln d wlersema,gj		1976
NZSTB	36--	5	429	463	ceel eval condit, free rang dee riney,t		1955

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
NAWTA	1----		396	398	alal malnutr, decline, isle roy hickie,pf		1936
NAWTA	11---		296	306	alal present status, isle royal aldous,se; krefti		1946

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	34--	4	904	907	rata dried marrow wt, fat indic neiland,ka		1970

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
							anam

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
							bibi

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ovca

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

ovda

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

obmo

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

oram

CODEN VO-NU BEPA ENPA ANIM KEY WORDS----- AUTHORS----- YEAR

JOMAA 22--1 47 53 biga det proper wint forag util swift,lw 1941

UNIT 1.2: COMPETITION BETWEEN HERBIVORES

Competition between some of the different species of wild ruminants and between wild and domestic ruminants is inevitable because many of the species live on the same range. Their behavior patterns are not identical (See PART II, CHAPTER 5) nor are their food habits (See PART IV, CHAPTER 12). Thus the extent of competition between herbivores varies, depending on species, areas, and population levels.

It is important to realize that population levels are a prime determinant of the extent of competition, and that too many of the same species results in competition between herbivores too, even if they have the same scientific name but are of different ages, sexes, sizes, and dominance classes.

The extent of competition also depends on the amount of overlap in areas used. There is an effective reduction in competition within most species during the summer when animals space themselves out, establishing at least loosely-defined maternal territories. Different species share areas to different extents, with no overlap for some (caribou and bighorn sheep, for example), and considerable overlap for others (white-tailed and mule deer in the Western States, for example).

Another kind of herbivore competition that should be given more attention than it has in the past is the competition between herbivores of different orders, classes, and even phyla. The competition between snowshoe hare and white-tailed deer, for example, may be greater than realized. Direct competition is not the rule, but the hares may browse on some of the same forages that deer do, though at different stages in plant growth. There is also competition between different orders; deer and turkey compete for acorns, for example. There is also competition between large herbivores, such as wild ruminants, and small herbivores, such as insects. The amount of such competition varies from year to year, primarily because of large fluctuations in insect populations.

When does competition between herbivores become excessive? There is no simple answer to that question. I attended a seminar recently on the question of whether there was competition between domestic cattle and wild ruminants in Africa. The concluding answer was "no." How frustrating to listen to an hour-long talk on a complex ecological subject only to have it concluded with a two-letter word. Think gradients rather than either/or.

The SERIALS listed include information on the relationships between herbivores on the same range. Some of these relationships may result in competitive advantages and disadvantages. Think gradients and relationships, synthesizing changing population densities and different amounts of overlap in the use of range resources to arrive at variable answers that are functions of the competitive advantages and disadvantages.

REFERENCES, UNIT 1.2

COMPETITION BETWEEN HERBIVORES

BOOKS

TYPE	PUBL	CITY	PGES	ANIM	KEY WORDS-----	AUTHORS/EDITORS--	YEAR
aubo	stac	hapa	668	odhe	lvstck, compar forag utili	williamson,c	1956
edbo	uwyf	lawy	294	ceel n	amer elk: ecol, beh, mgt	boyce,ms; hayden-	1979

SERIALS

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
FOSCA	1---2	130	139	od--	doca, range relatns, utah	julander,o	1955
JRMGA	2---4	206	212	od--	lvstck wint forag stud,cal	dasmann,wp	1949
JWMAA	17--2	101	112	od--	dosh, competition in utah	smith,jg; julande	1953
JWMAA	39--4	813	813	od--	wnt field test,suppl blcks	anderson,rh; you/	1975
UAECA	121--	1	17	od--	deer mgt,range lvstck prod	stoddart,la; rasm	1945

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
AMNAA	31--3	697	743	odvi	rang veg rel to lvstck,tex	buechner,hk	1944
JWMAA	32--3	558	565	odvi	odhe, habitat relns, monta	martinka,cj	1968
JWMAA	42--1	101	107	odvi	odhe,forag relns betwn,tex	krausman,pr	1978

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
CGFPA	21---	1	20	odhe	doca, sagebr, use wint ran	anderson,ae	1969
HILGA	47--6	191	247	odhe	dosh, food relatns, califo	longhurst,wm; co/	1979
JRMGA	30--2	110	116	odhe	lvstck rel,ldgpl pine,oreg	stuth,jw; winward	1977
JWMAA	13--4	421	423	odhe	lvstck, eff on range, utah	smith,ad	1949
JWMAA	39--3	605	616	odhe	range rels, prairie habita	dusek,gl	1975
NAWTA	17---	448	458	odhe	doca, rumn cont, competitn	davis,rb	1952
WLMOA	20---	1	79	odhe	ceel, doca, rang ecol, rel	mackie,rj	1970

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
BICOB	3---	1 23	32		ceel lvstck range compet, calif ciriacy-wantrup,/		1970
JRMGA	4---	4 279	280		ceel elk management problems cooney,rf		1951
JRMGA	5---	1 3	7		ceel elk problems in montana cooney,rf		1952
JWMAA	7---	3 328	332		ceel lvstck, compet summr range pickford,gd; reid		1943
JWMAA	30---	2 349	363		ceel lvstck, range relatns, mon stevens,dr		1966
NAWTA	14---	513	526		ceel lvstck, rang carry-capacit rasmussen,di		1949
NAWTA	25---	387	395		ceel elk-cattle competitn prblm jones,da		1960
WMBAA	19---	1	62		ceel doca,rng rel,ridng mt n pk blood,da		1966

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	40--	1 151	162		rata muskox-carib sum ran relat wilkinson,pf; sha		1976

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JANSA	40--	5 985	992		anam antmop, lvstck, rangelands yoakum,jd		1975
TRVIA	1961-	266	285		anam lvstck,reg numbrs,land use buechner,hk		1961

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
bibi							

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
JWMAA	13--	4 417	418		ovca od, food relationsh, n mex halloran,af		1949
tdbca	8----	29	36		ovca relns,feral burros,blk mts mcmichael,tj		1964

CODEN	VO-NU	BEPa	ENPA	ANIM	KEY WORDS-----	AUTHORS-----	YEAR
ovda							

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
JWMAA	40--1	151	162	obmo	rata, summer range relatns	wilkinson,pf; sha	1976

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
				oram			

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
JRMGA	28--1	43	47	many	diet overlap, s colorado	hansen,rm; reid,l	1975
JRMGA	30--1	17	20	many	food rels, red desrt, wyom	olsen,fw; hansen,	1977
NAWTA	29---	404	414	many	range rels, summr rng,utah	julander,o; jeffe	1964

CODEN	VO-NU	BEP	ENPA	ANIM	KEY WORDS	AUTHORS	YEAR
JRMGA	11	18	21	biga	lvstck, tech, study compet		1958
JRMGA	25--5	346	352	biga	dosh, guidelnes, graz,wint	jensen,ch; smith/	1972
JWMAA	21--1	101	103	----	interpr ovrbrws n e forst	webb,wl	1957
NAWTA	10---	251	256	biga	lvstck competitn, w ranges	stoddart,la; rasm	1945
XFRMA	4----	1	16	vert	habitat relations of verte	reynolds,hg; john	1964

OTHER PUBLICATIONS

Nelson, J. R., and D. G. Burnell. 1975. Elk-cattle competition in central Washington. p. 71-83. In Range Multiple Use Mgmt. Washington State University, Oregon State University, University of Idaho.

