N.25/3

REPORT 1

1974 GAME CENSUS IN ETOSHA NATIONAL PARK BY HELICOPTER

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I. INTRODUCTION

The first game census of Etosha with the aid of a helicopter was conducted by Joubert et al. in September 1973. Their findings are that census by helicopter is more accurate than previous years' censusses which were done by light, fixed-wing aircraft. They report increases in species numbers, due to this accuracy, ranging from 30% (Burchell's Zebra) to 400% (Red Hartebees). Limiting factors mentioned during the 1973 census were the lack of support by the fixed-wing aircraft for checking areas of low population density and the necessarily wide transects flown in sparsely populated areas to save flying time.

In 1974 a second census of the larger animals of Etosha was carried out by helicopter from 2 - 13 July.

II. METHOD

A 280 H.P. "Bell" helicopter, seating two passengers abreast of the pilot, was used. The helicopter had a range of 3,0 hours (+15 mins. safety margin) with full tanks.

The census of the main game reserve was conducted with one observer (HHB) present throughout and a Nature Conservator for each of Etosha's eight areas present when a particular area was counted. The Kaross/ Koabendes enclosures at Otjovasandu were censussed separately by JMH on 26th. July, immediately prior to a game capture operation there.

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We attempted to follow the method established by Joubert et al. and our transects varied accordingly from 1 - 5km- wide swaths. Where game concentrated we deviated from the transect and encircled the herds or hovered. In the sparsely populated areas of the 19th latitude and the south-eastern sector of Etosha we counted sample areas, taken at random. Figure I indicates the intensity of transects flown as well as the random sampling.

All animals (including birds) which could be identified with certainty were counted and we differentiated as far as possible between adult and young, male and female. In five areas (I - V in Figure I) one observer recorded numbers on a tape whilst a second observer noted them on paper. In three areas (VI - VIII in Figure I) both observers recorded on tape. The numbers were checked as far as possible between the observers at the time of counting, although when large, mixed herds were encountered numbers could only be checked afterwards. We counted individual animals until the herd size made this impossible and then sample-counted 100 individuals and, using this as a basis, estimated the total number present. The pilot did not count but was asked to draw our attention to animals we overlooked.

Censussing was undertaken consequetively for five days with a day's interruption for maintainence of the heli= copter and was then continued for a further six successive days. Civil aviation regulations allow the pilot a maximum flying time of 6,0 hours per day and 30 hours per week.

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Table I reflects the time of day flown and the time allocated to each area. Shadow-effect was too pronounced before 08h30 and after 17h30 to count accurately.

The average air speed at which counts were done varied from 100 - 130 km/h, depending upon the wind. Height, above ground varied from 20 m when counting Springbuck herds on the plains to 100 m when counting elephant in Mopane veld.

III. RESULTS

Table II gives the species totals for Etosha National Park, sub-divided into seven main areas. Table III shows some bird species counted. Table IV compares the grand totals of the 1973 and 1974 census. Figures II - XV are histograms of the herd (or pride or flock) size of the commoner species.

IV. DISCUSSION

1. Burchell's Zebra (Fig. II). Areas of greatest concentration were Okaukuejo, Halali, Gobaub (50%. 18% and 15% of the total population occurred there respectively). Thus in July 1974, 83% of this species was concentrated here. In September 1973+ 81% were in the same area.

The area showing the sharpest increase in zebras is Otjovasandu (from 693 in 1973+ to 1096 in 1974 = 58% increase). This may be related to the relatively low number of lions in the Otjovasandu area as well as the abscence of anthrax.

In contrast to 1973+ we could not visually isolate the family unit accurately in large congregations especially at watering places. Our sample for determining family size was therefore smaller (131 as aginst 609 sampled in 1973+). Family units of 3 - 8 individuals comprised 50% of the sample (cf. 70% in 1973+) and of greater than 9 individuals comprised 32% (cf. 22% in 1973+). The largest family unit which could be isolated with certainly was 20 animals (17 adults, 3 young). In the sample of 131 family units 2985 were full grown and 444 foals from the previous season. Percentage of young was therefore 15% (12% in 1973+).

2. Hartmann's Zebra (Fig. III). In a sample of 52, family unit size was 13,5% (twosomes), 38,5% (4 - 7 animals), whilst the largest family unit was 15 animals (1,9%) cf. 5,2%, 65,2% and 6% respectively in 1973+.

3. Blue Wildebeest (Fig. IV). The total population showed a continued decrease from 3717 in 1973+ to 3 300 in 1974 (11%). The two areas of greatest concentration were Okaukuejo (especially Okondeka) where 1 517 were counted and Namutoni (equally divided between Fischer's Pan and Andoni) where 1 331 were counted. The small herd of 25 seen at Duineveld in 1973+ had decreased to 16 in 1974.

Solitary, territorial bulls comprised 2% of the total population (cf. 17% of the observations in 1973+). In a sample of 167 observations 52% comprised herds of 10 or more animals (≡ 1973+).

4. Springbuck (Fig. V). The 19th. latitude and the adjoining

+ refer Joubert et al.

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omurambas west of Grootvlakte held large numbers (1 033). To our knowledge it is the first recorded time that Springbuck have been so noticeable in the 19th. latitude, a tendency which continues to the present time.

Solitary, territorial rams comprised 1% of the total population (cf. 15% of the observations in 1973+). In a sample of 347 observations 68% comprised herds of 10 - 20 animals, 28% comprised herds of 21 - 100 animals, whilst 4% comprised herds of more than 100 animals (cf. 42%, 19% and 0,6% respectively in 1973+). Springbuck experienced an unusual lambing season which started in September 1974 and continued through until June 1975.

5. Gemsbok (Fig. VI). Solitary animals comprised 6% of the total population (cf. 29,4% of the observations in 1973+). In a sample of 342 observations 10% comprised herds of 10 - 20 animals and 4% comprised herds of more than 20 (cf. 7% and 3% respectively in 1973+).

The adult : young calf ratio was 2537 : 98 which is 3,5% (cf. 8% in 1973+).

6. Black-faced Impala. A total of 55 were counted south of Namutoni (Klein Namutoni area). They comprised six groups, made up as follows: 12 (not sexed), 16 (4 rams, 12 ewes), 10 (1 ram, 9 ewes), 8 (2 rams, 6 ewes), 5 (1 ram, 4 ewes) and 4 (2 rams, 2 ewes). In 1973+ 27 impala were counted near Namutoni.

7. Giraffe (Fig. VII). The greatest increase in numbers was at Otjovasandu (115 in 1973+, 231 in 1974). Solitary animals comprised 20% of the total population (39% of the observations in 1973+). In a sample of 157 observations 9% were twosomes and 31% were herds

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larger than six animals (cf. 25% and 6% in 1973+). Adult : calf ratio was 963 : 128 which is 13% of the population (cf. 24% in 1973+).

8. Red Hartebeest (Fig. VIII). The Halali-Gobaub count was 46 and 23 respectively; considerably less than the figures of 122 and 267 counted there in 1973+). Otjovasandu showed the highest tally (83) which is 35% of the total count of 234 (cf. 26% in 1973+).

In a sample of 49 observations 90% were in herds of up to 10 animals. The largest herd seen was 17 (26 in 1973+).

The adult : calf ratio seen was 234 : 7 which is only 3% (cf. 16% in 1973+). It is possible that the breeding herds were in the Mopane veld which could not be censussed due to the time limit.

9. Eland (Fig. IX). The species' sharp decline appears to have continued and only 84 of the 289 counted were found outside Kaross/Koabendes (29%), (cf. 53% in 1973+). There were 11 sightings compared to 40 in 1973+ and from the sparse data available the bull : cow : calf ratio was 1 : 1 : 0,08 (only two calves were seen). Two "blue" bulls were sighted. The largest bull herd was 12 and cows 19 (cf. 12 and 13 in 1973+).

10. Kudu (Fig. X). The majority (500 = 41%) were counted in the Namutoni area. In a sample of 890 animals the male : female sex ratio was 1 : 3,5 (1 : 3,1 in 1973+). Cow herds were mostly 2 - 9 individuals with 19 cows the most sighted together. Solitary bulls made out 57% of

the total adult male population. Adult : calf ratio was 21% (22% in 1973+).

A siren on the helicopter was used with success to flush kudu from thickets.

11. Elephant (Fig. XI). The bull herds numbered mostly 1 - 3 individuals (83%) compared to 77% in 1973+. Up to seven bulls were found together. There were 19 breeding herds (51 in 1973+) ranging from 6 - 36 members. Bull : cow : calf (< 10 years) ratio was 1,29 : 10 : 3,56 with 24% of the population being young animals (35% in 1973+).

12. Warthog (Fig. XII). Otjovasandu - Kaross/Koabendes carries the largest concentration with 58 and 101 counted there respectively (49 and 80 in 1973+). Piglets comprised 14% of the population (179 adults, 30 piglets).

13. Lion (Fig. XIII). The largest pride seen was 11; mostly there were twosomes (7 of the 20 sightings).

14. Ostrich (Fig. XIV). Okaukuejo area held 47% of the total population (358 out of 757 birds). Cock : hen ratio was 1 : 0,9 (1 : 0,6 in 1973+). Two large flocks of immature birds numbering 38 and 60 could not be sexed.

15. General. We were allowed 60 hours to complete the census (excluding Kaross/Koabendes) and had covered the planned transects in 59h40 which allowed 20 minutes to specifically search for Cheetah in the Chudop area of Namutoni. (A female and three half-grown cubs had been sighted by the fuel truck but could not be found by helicopter).

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The 1974 census took about 11 hours longer than in 1973. All known areas of game concentration were flown. As in 1973 we were unable to cover vast areas of Mopane veld and thus our figures are not a reflection of the total animal numbers. The open plains animals (Burchell's Zebra, Blue Wildebeest, Springbuck) are the most accurately censussed as well as the animals in Kaross/Koabendes.

V. COST

	R C
Hire of helicopter (60 hours at R100/hour)	6000-00
Fuel truck (1147km at 12c/km)	148-00
Nature Conservation personnel salary	
(2 Europeans for 11 days)	325-00
(2 non-Europeans for 11 days)	55-00
S & T for personnel	120-00
	6648-00

VI CONCLUSIONS AND RECOMMENDATIONS

1. Table IV reflects great variation between the 1973+ and 1974 aerial census. At least six factors are respon= sible for this:

   i. The counts were done in September and July respectively.

   ii. 1972/73 was a season of poor rainfall (218 mm at Okaukuejo); 1973/74 was an excellent rainy season (554 mm at Okaukuejo). This resulted in water, and hence game, being more widely distributed during July 1974.

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iii. The above average rains of 1973/74 (Okaukuejo average = 419 mm) gave greater vegetative cover, making it difficult to see species such as lion, giraffe and kudu.

iv. Different pilots and observers were employed in 1973 and 1974.

v. The fixed-wing aircraft was unavailable during the helicopter census in 1974.

vi. In 1973 different observers took part during the course of the census; in 1974 one observer was present for the entire census and only the second observer (Nature Conservator) changed as the area counted changed.

2. These six variables make the comparison between the 1973 and 1974 censusses impractical except in the case of the open plains species, i.e. Burchell's Zebra, Blue Wilde= beest and Springbuck. Over-hasty conclusions should thus not be made from the comparisons in Table IV, i.e. 137 lions counted in 1973 compared to 80 lions counted in 1974 (a "decrease" of 42%).

3. It is obvious that variables will have to be kept to a minimum in order to produce comparable results. The time of year in which counting is done must be kept constant. Because heavy late rains can greatly influence game distribution, it will be best to census as late in the dry season as possible, but before the ambient temperature increases significantly, to achieve effective helicopter performance. Based on the 1974 Okaukuejo weather readings, minimum temperatures increased above $10^{o}C$ by mid-September whilst maximum temperatures increased above $30^{o}C$ during the same period. The annual game census should apparently be commenced at

the beginning of September, to be completed by mid-September.

Observers (and pilot) should be kept constant, with one specific observer present throughout the census. The Pasture Research Officer should be involved in those parts of the census where grazing (i.e. Chudop) or browsing is a problem. The total number of flying hours (Kaross/Koabendes excluded) can be kept at 60 unless there is a change in game distribution, i.e. Springbuck on the 19th latitude, whereupon it will become necessary to increase the censussing time.

VII. ACKNOWLEDGEMENTS

Capt. A. Karas and Flight Engineer J. Evans of Court Line Helicopters are thanked for their assistance and enthusiasm during the count. Mrs. C. Kroon is thanked for the meals and facilities provided at Otjovasandu. The Tourist Officers at all camps did their best to provide suitable accomodation for the crew.

VIII. REFERENCE

Joubert, E, du Preez, J.S and Grobler, H.
Lugsensus van die wild in die Nasionale Etoshawildtuin gedurende September 1973 met behulp van 'n helikopter.

H.H. BERRY
8th. August 1975.

Table I: Time of day flown and time allocated to areas censussed.

Day	Area	Time (hours)			
		Start	End	Flight total	Day total
1	I	0920 1330	1210 1610	2:50' 2:40'	5:30'
2	I II	0840 1230 1605	1135 1445 1635	2:55' 2:15' 0:30'	5:40'
3	II III IV	0900 1135 1505	1105 1255 1740	2:05' 1:20' 2:35'	6:00'
4	III III + IV	0835 1220	1130 1450	2:45' 2:30'	5:15'
5	IV	0835 1155	1110 1415	2:35' 2:20'	4:55'
6	-	Rest	Rest	-	-
7	IV + V V	0845 1215	1130 1435	2:45' 2:20'	5:05'
8	V + VI	0840 1115 1200	1100 1130 1455	2:20' 0:15' 2:55'	5:30'
9	VI	0840 1305	1140 1535	3:00' 2:30'	5:30'
10	VI VII	0835 1230	1135 1530	3:00' 3:00'	6:00'
11	VIII	0825 1210	1125 1500	3:00' 2:50'	5:50'
12	VII	0835 1150	1120 1350	2:45' 2:00'	4:45'

Table II: Animal species totals in the 7 main areas of Etosha National Park.

Species	Area						
	Namutoni	Halali	Gobaub	Okaukuejo	19th. Lat.	Otjovasandu	Kaross/ Koabendes
Burchell's Zebra	972	2 592	2 270	7 282	205	1 096	133
Hartmann's Zebra	0	0	0	0	0	410	144
Blue Wildebeest	1 331	312	101	1 517	39	0	0
Springbuck	1 165	576	157	3 901	1 033	176	3
Roan Antelope	0	0	0	0	0	0	177
Gemsbok	169	237	17	653	218	737	506
Black-faced Impala	55	0	0	0	0	36	261
Giraffe	394	75	22	72	41	231	128
Red Hartebeest	6	46	23	24	50	83	2
Eland	16	0	19	12	25	14	205
Kudu	500	41	20	21	13	318	310
Black rhinoceros	0	0	2	2	2	16	14
Elephant	206	103	3	185	53	275	10 (temporary)
Steenbuck	13	3	2	1	3	3	0
Grimm's Duiker	3	0	0	0	0	0	0
Warthog	17	8	2	5	18	8	101
Lion	20	4	8	48	0	0	0
Spotted Hyaena	3	5	0	10	0	0	0
Black-backed Jackal	35	4	5	18	2	5	1

Table II (continued) - 2 -

Species	Area						
	Namutoni	Halali	Gobaub	Okaukuejo	19th. Lat.	Otjovasandu	Kaross/ Koabendes
Bat-eared Fox	2	0	0	8	0	0	0
Ostrich	92	23	11	358	86	106	81
Kori Bustard	67	10	5	33	11	2	
Guineafowl (flocks)	610 (19)	240(5)	490(5)	280(6)	170(6)	130 (3)	-
Secretary Bird	4	5	0	6	2	2	-
Blue Crane	48	7	0	33	0	0	-
Klipspringer	0	0	0	0	0	5	0
Honey Badger	1	0	0	1	0	0	0
Porcupine	1	0	0	0	0	1	0
Reedbuck	0	0	0	0	0	0	0
Tsessebe	0	0	0	0	0	0	0
Not counted in 1973:							
Baboon	0	0	0	0	0	0	15
Leopard	0	1	0	0	1	0	0
Damara Dik-dik	8	0	0	0	0	0	0

Table III: Some bird species counted in Etosha National Park.

Species	Area					
	Namutoni	Halali	Gobaub	Okaukuejo	19th.Lat.	Otjovasandu
Martial Eagle	0	0	1	1	1	0
Black Eagle	0	0	0	3	0	0
Bataleur Eagle	6	2	0	10	0	3
Tawny Eagle	3	2	3	3	0	0
Black-breasted Snake Eagle	0	2	0	2	0	1
Black Vulture	6	5	1	0	0	0
White-backed Vulture	9	2	11	0	0	0
Cape Vulture	0	1	0	0	0	0
White-headed Vulture	0	1	0	1	0	0
Vulture (unidentified)	129	27	0	3	16	23
White Pelican	30	1600	0	82	0	0
Flamingoes	1200	110000	0	175000	0	0

Table IV: Comparison of 1973 and 1974 censusses.

Species	Totals		% difference	
	1973	1974	Increase	Decrease
Burchell's Zebra	12 496	14 550	16	
Hartmann's Zebra	736	554		25
Blue Wildebeest	3 717	3 300		11
Springbuck	5 262	7 011	33	
Roan Antelope	159	177	11	
Gemsbok	3 788	2 537		33
Black-faced Impala	271	352	29	
Giraffe	935	963	3	
Red Hartebeest	549	234		57
Eland	423	289		32
Kudu	2 101	1 223		42
Black Rhinoceros	63	36		43
Elephant	1 293	835		35
Steenbuck	156	25		84
Grimm's Duiker	29	3		90
Warthog	147	209	42	
Lion	137	80		42
Spotted Hyena	13	18	38	
Black-backed Jackal	99	70		29
Bat-eared Fox	8	10	25	
Ostrich	719	757	5	
Kori Bustard	209	128		39
Guineafowl (flocks)	- (45)	2 120 (44)	-	-
Secretary Bird	7	19	-	-
Blue Crane	16	88	-	-
Klipspringer	1	5	-	-
Honey Badger	2	2	-	-
Porcupine	2	2	-	-
Reedbuck	1	0	-	-
Tsessebe	1	0	-	-

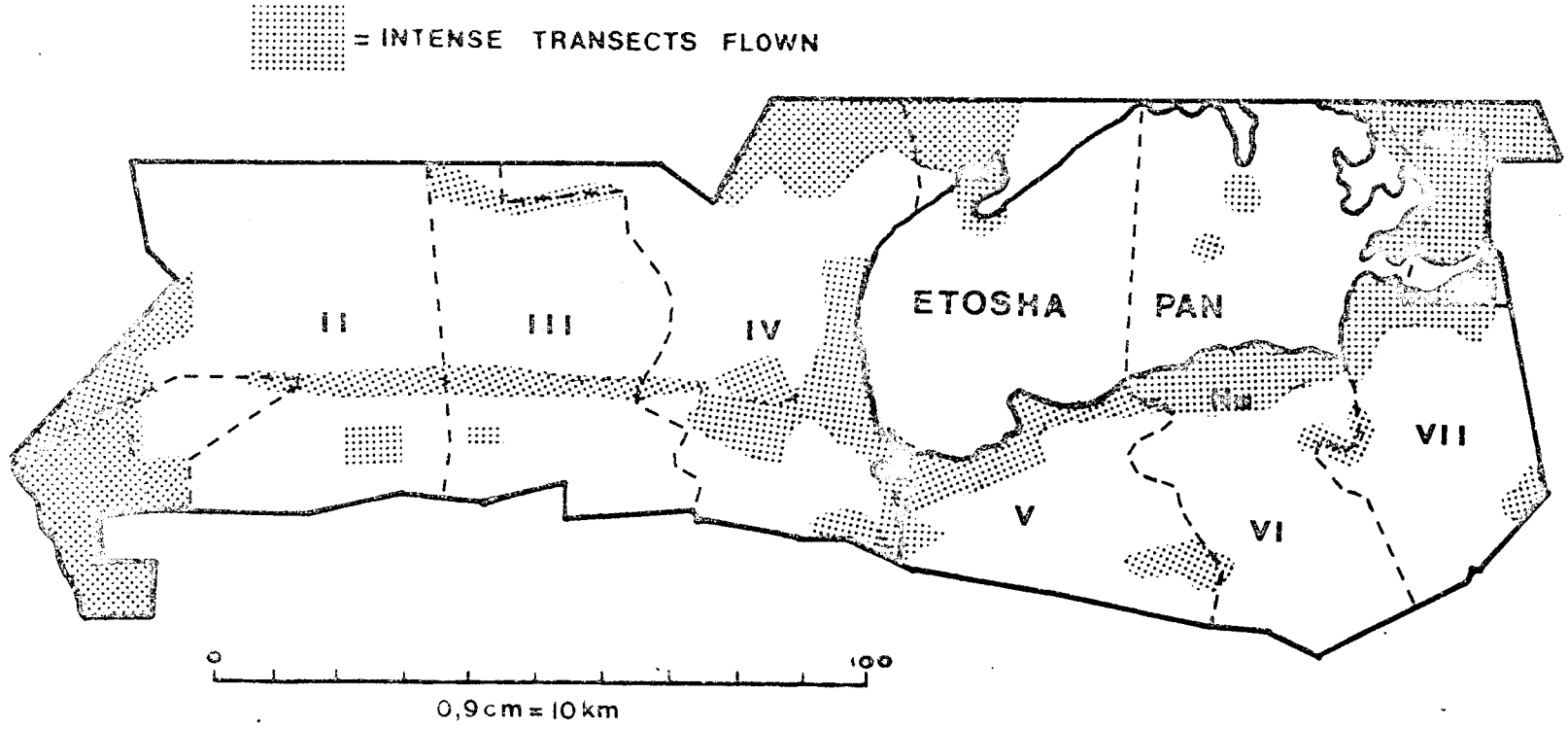


FIG. 1: AREAS CENSUSSED BY HELICOPTER IN 1974.

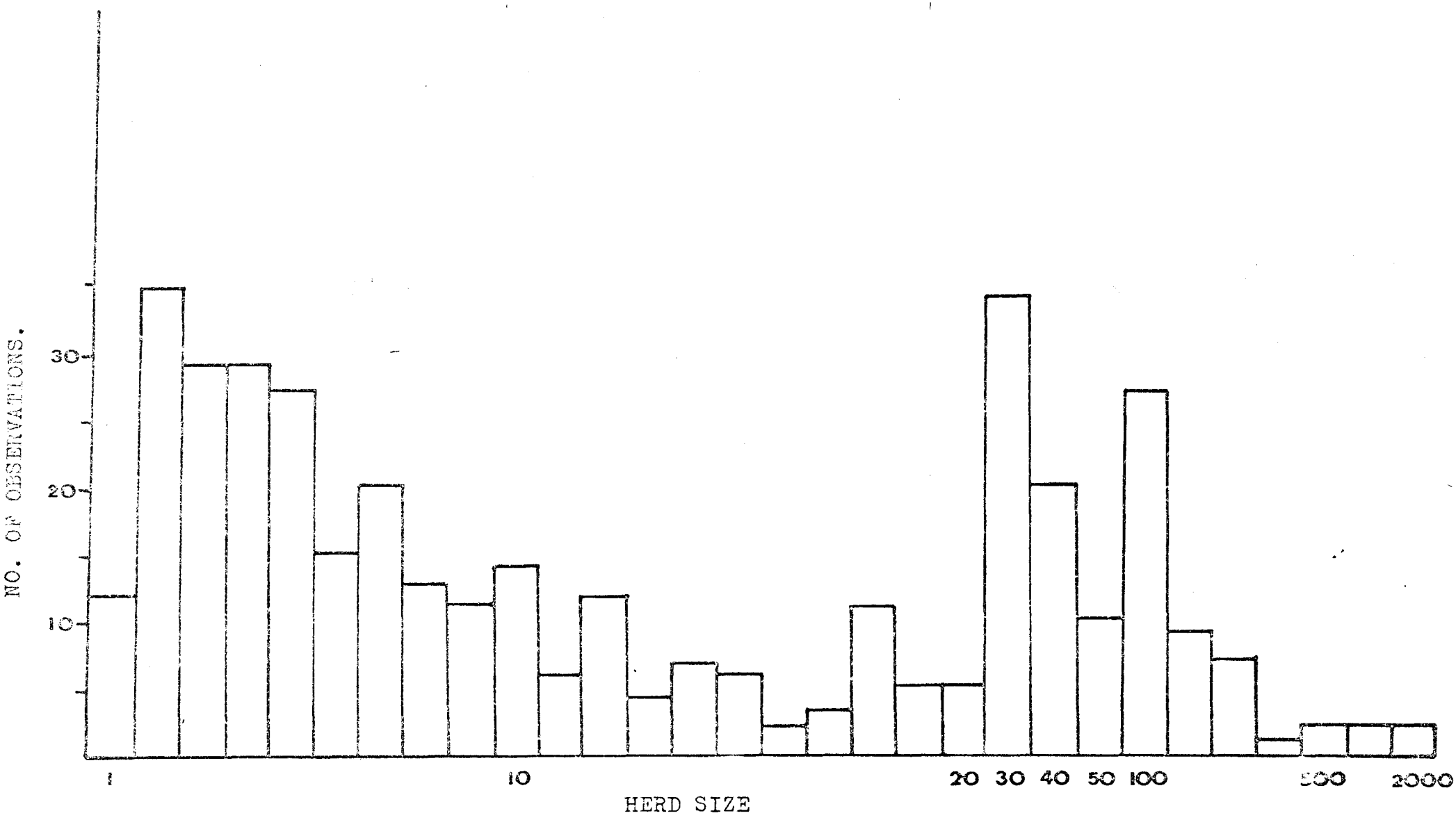


FIG. II: BURCHELL'S ZEBRA.

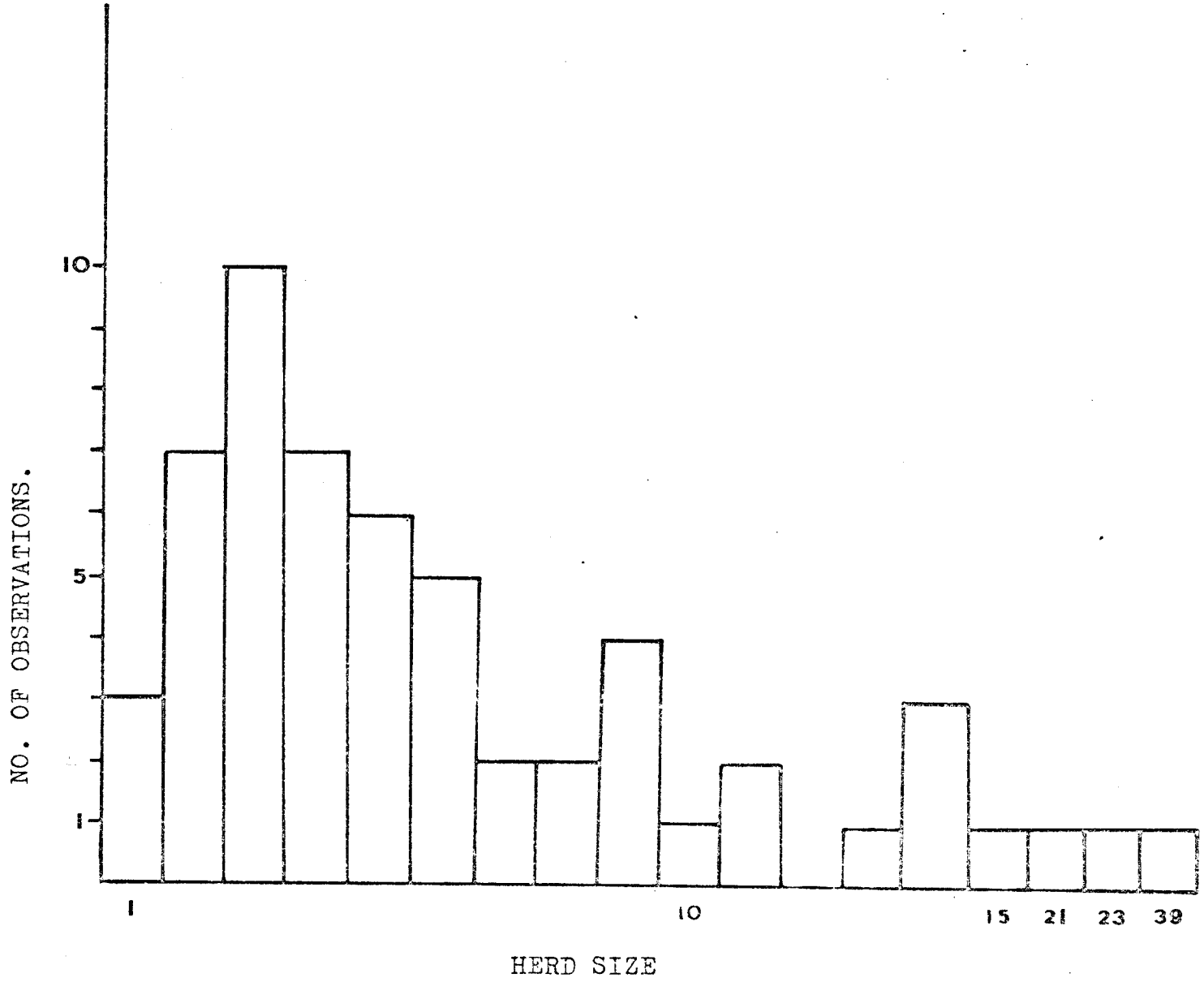


FIG. III: HARTMANN'S ZEBRA.

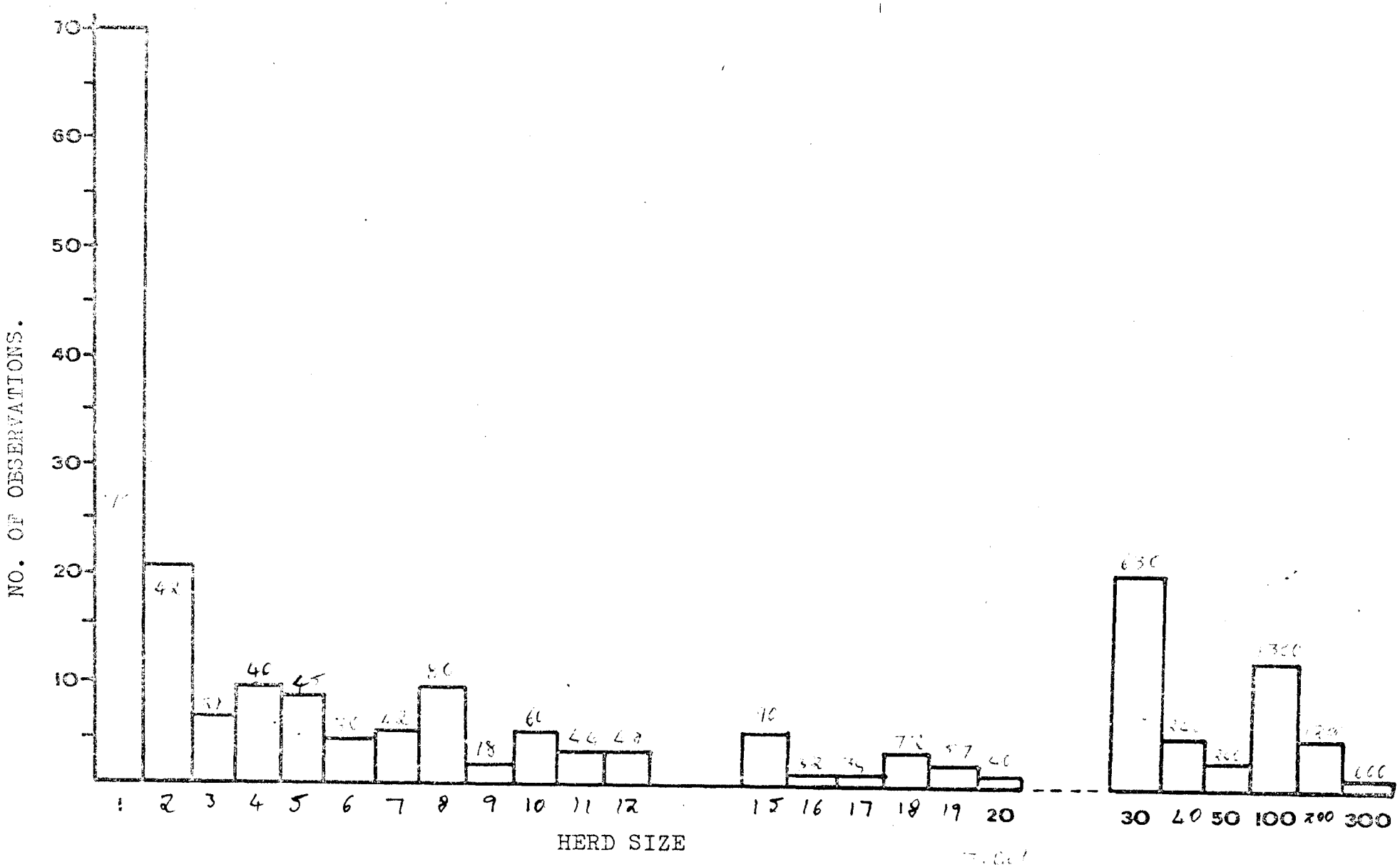


FIG. IV: BLUE WILDEBEEST.

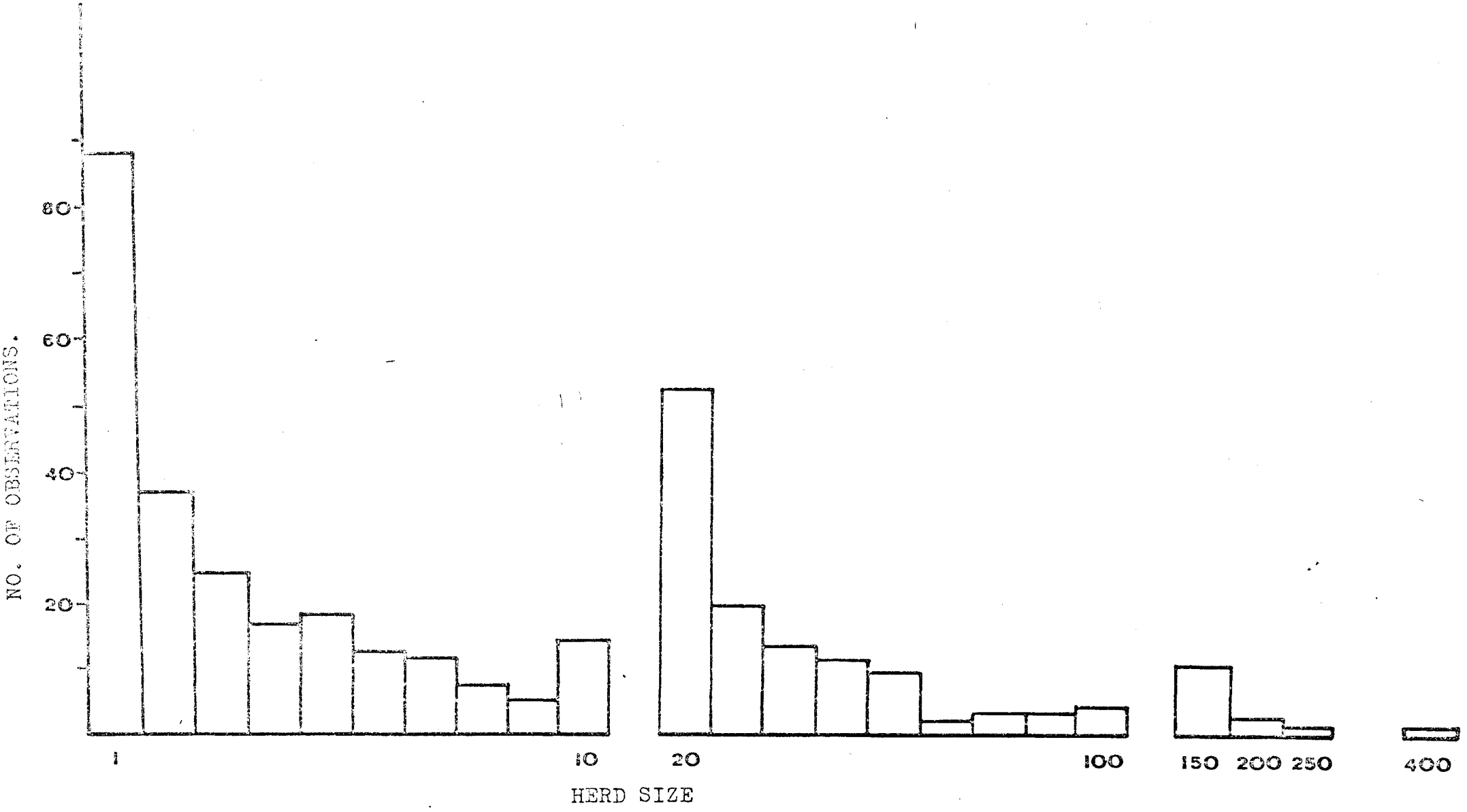


FIG. V: SPRINGBUCK.

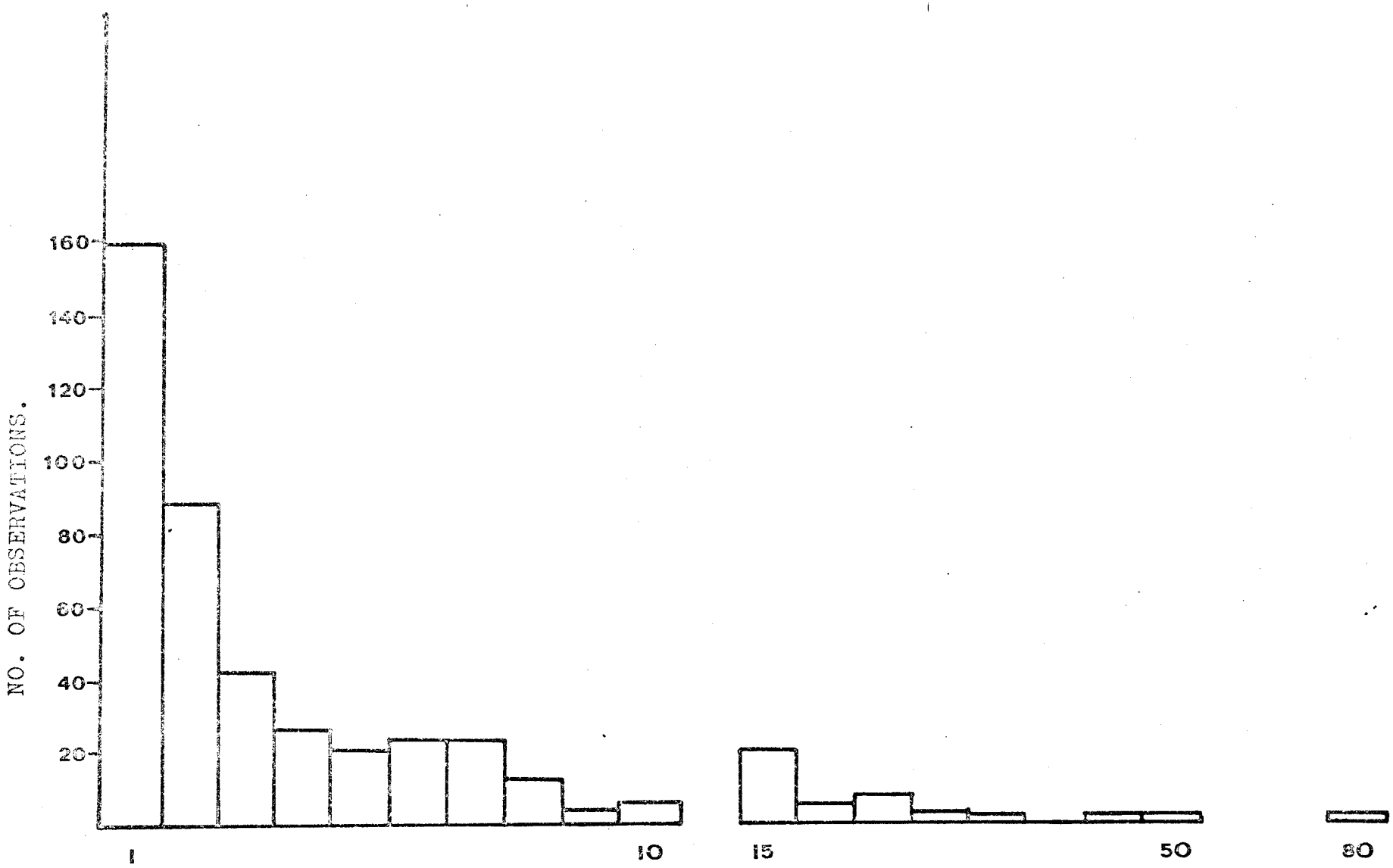


FIG. VI: GEMSBOK.

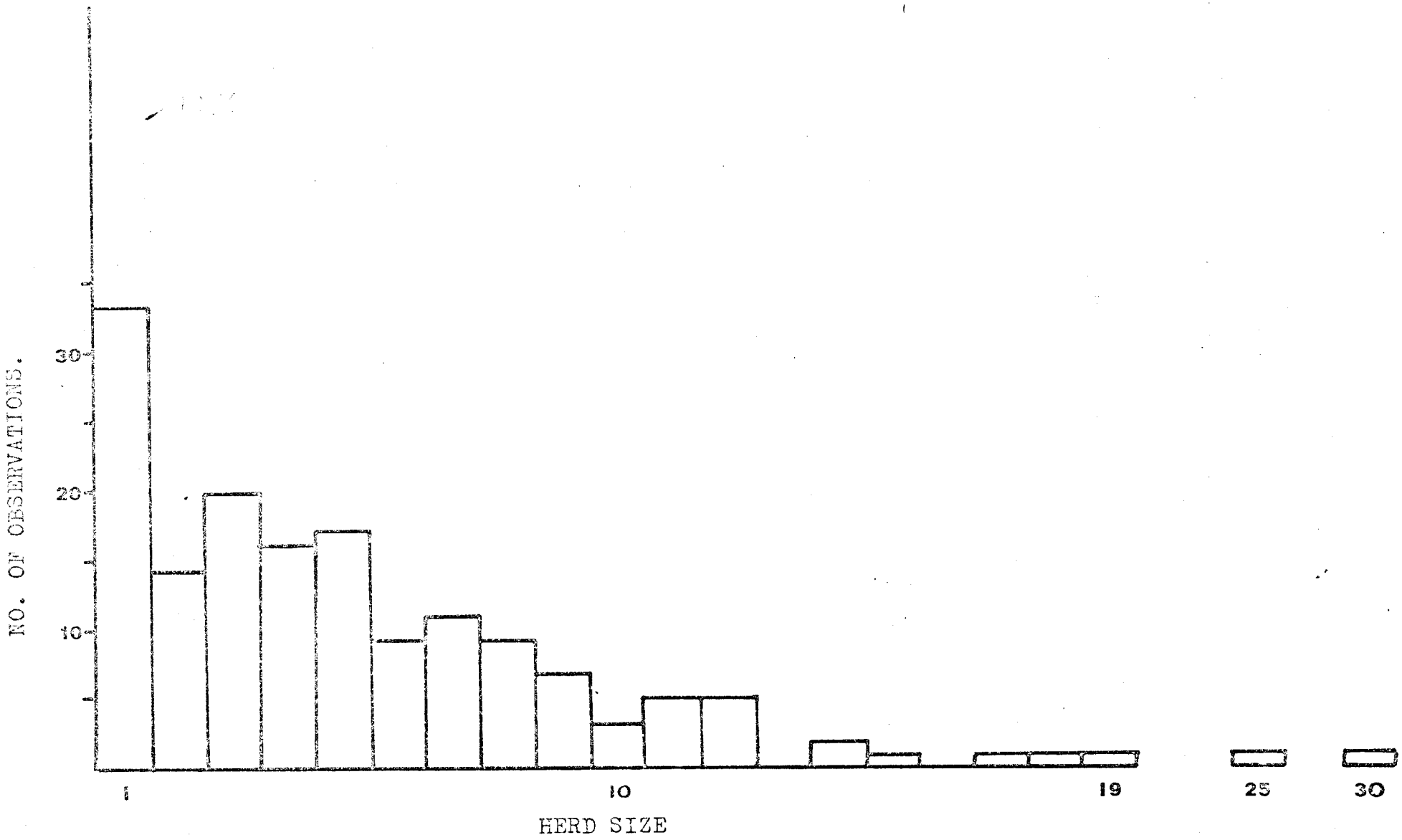


FIG. VII: GIRAFFE.

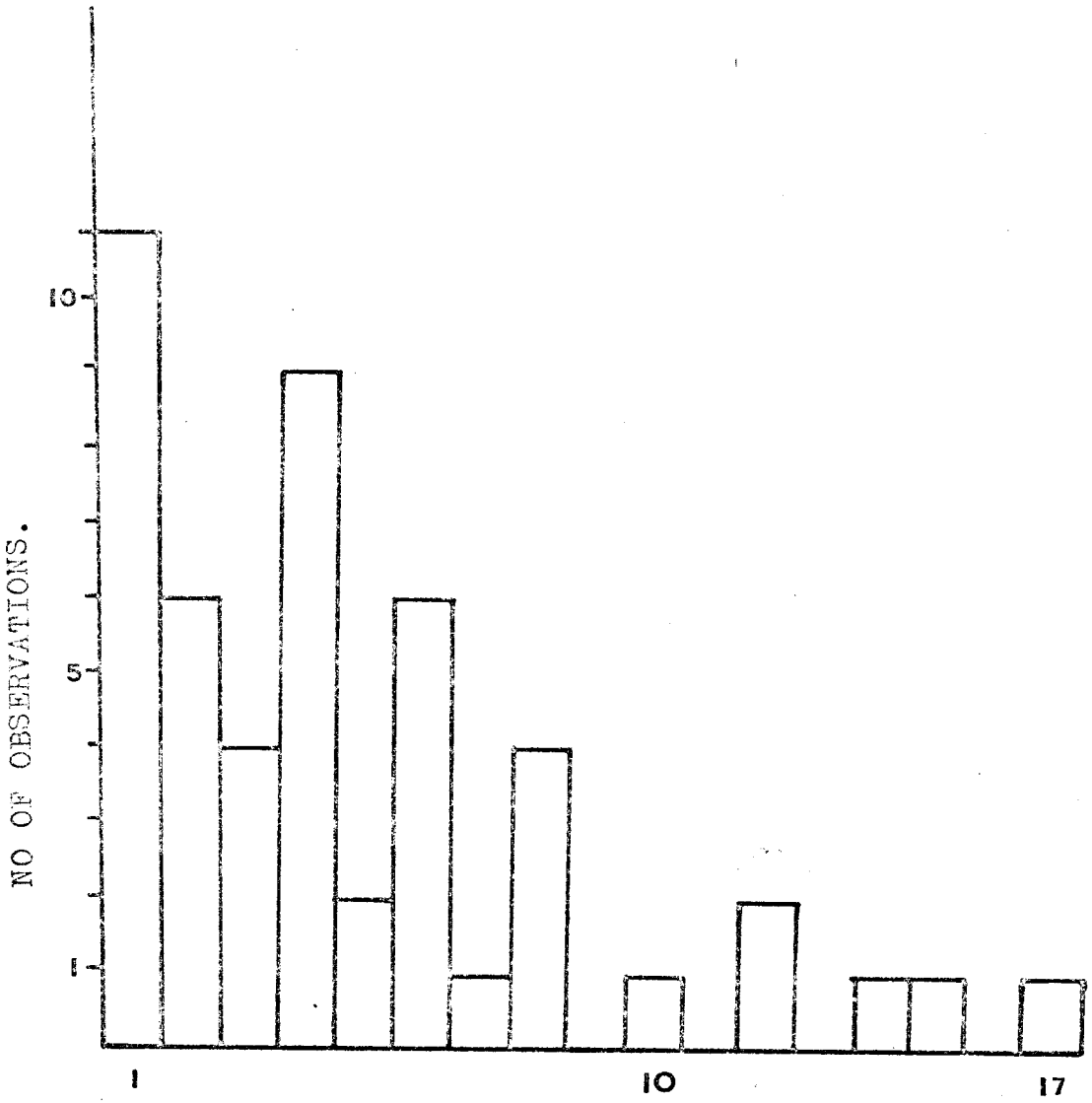
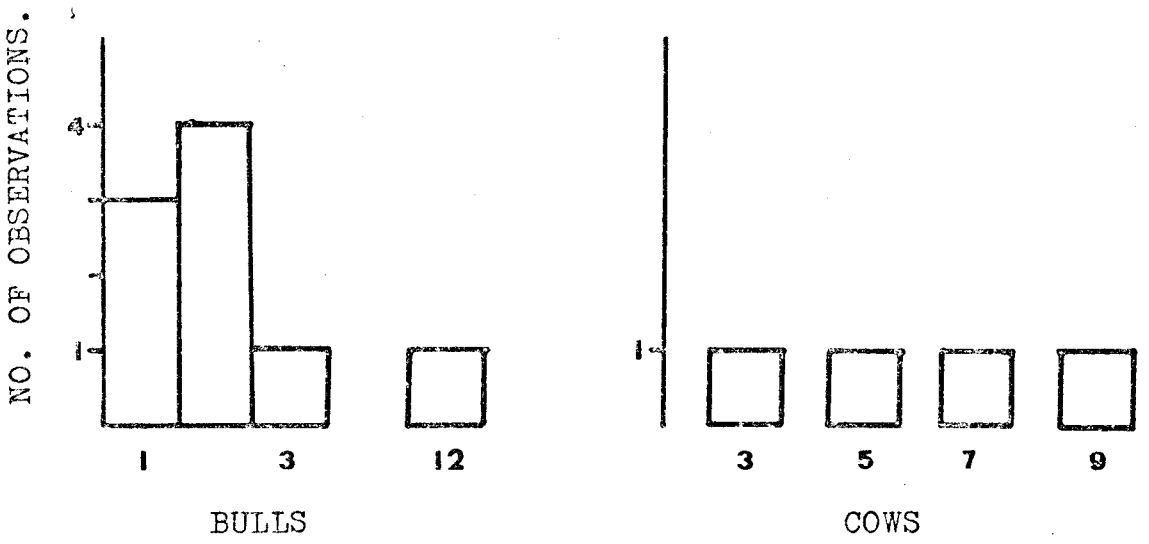


FIG. VIII: RED HARTEBEEST.

FIG. IX: ELAND.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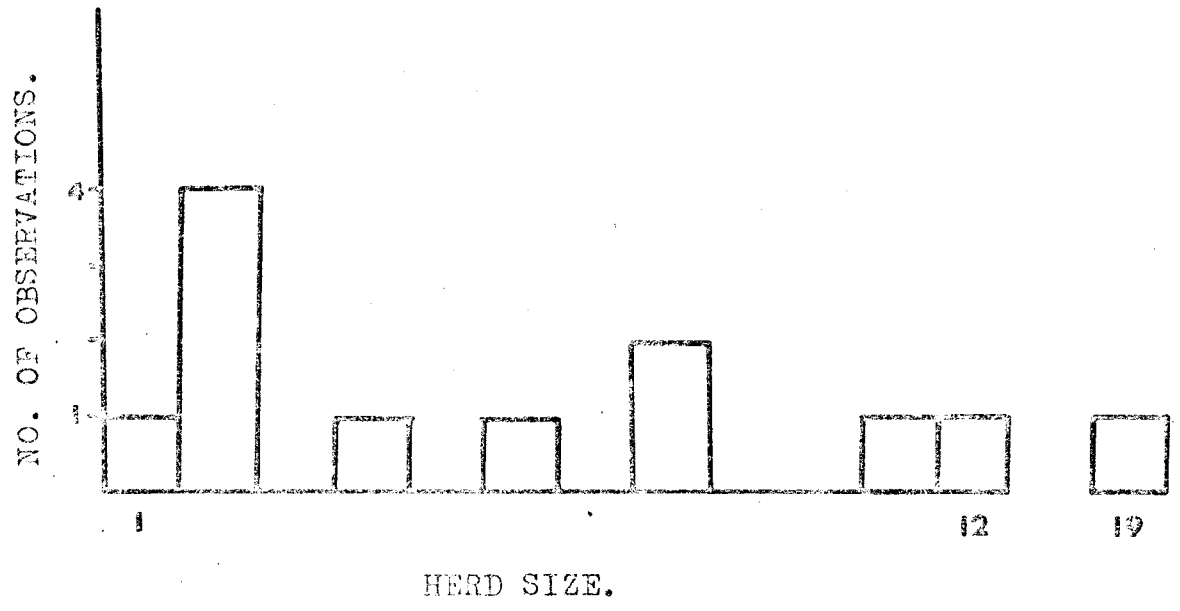
COWS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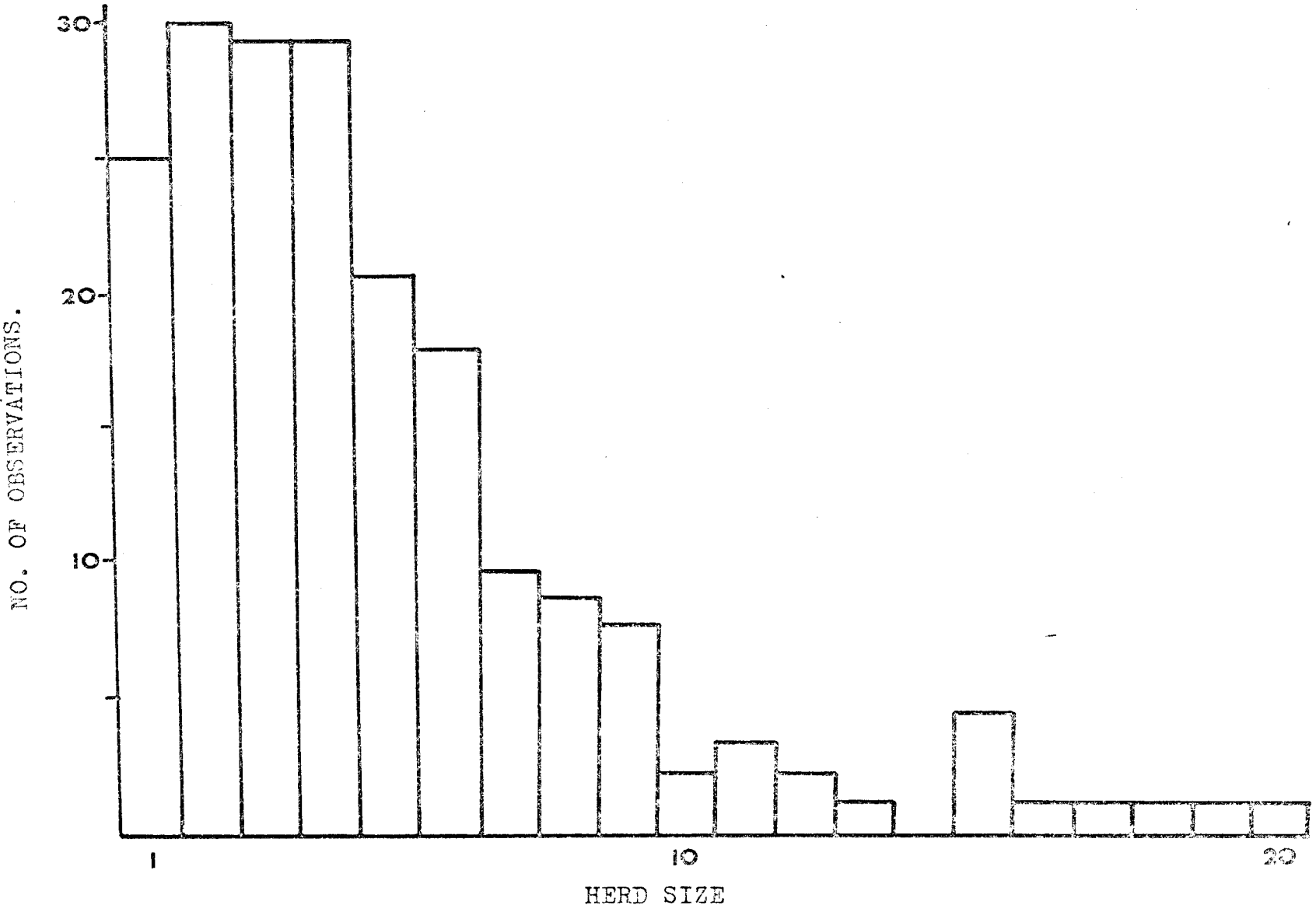


FIG. X: KUDU

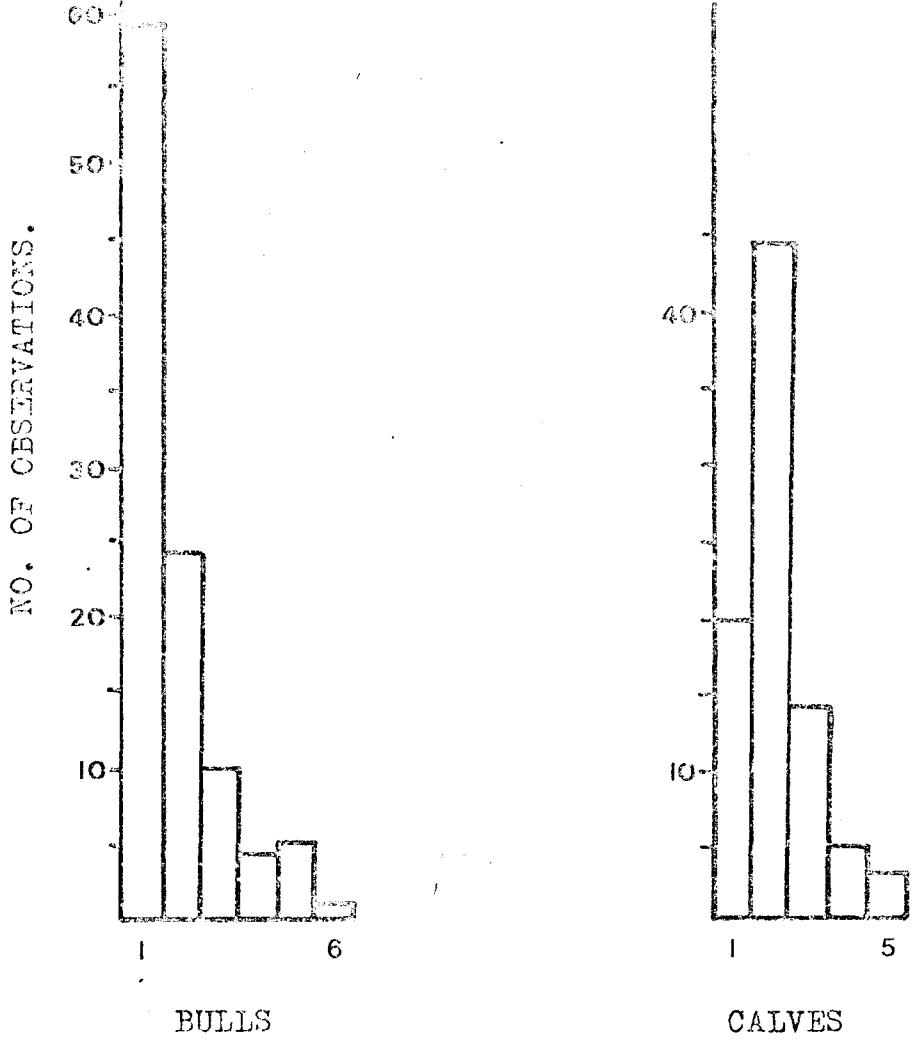
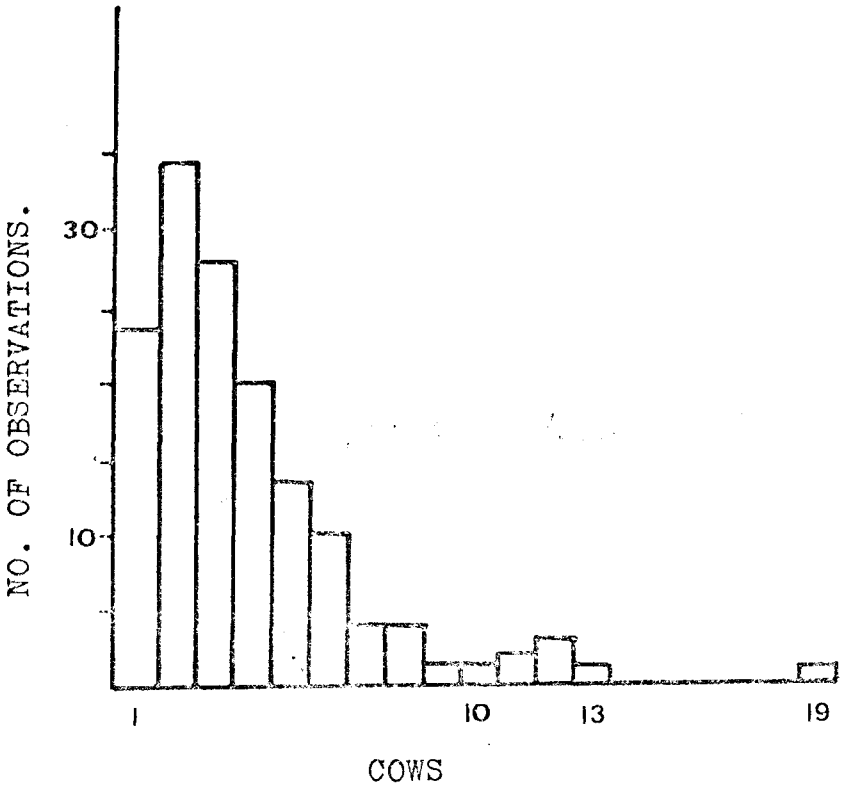


FIG. X (contd.): KUDU.



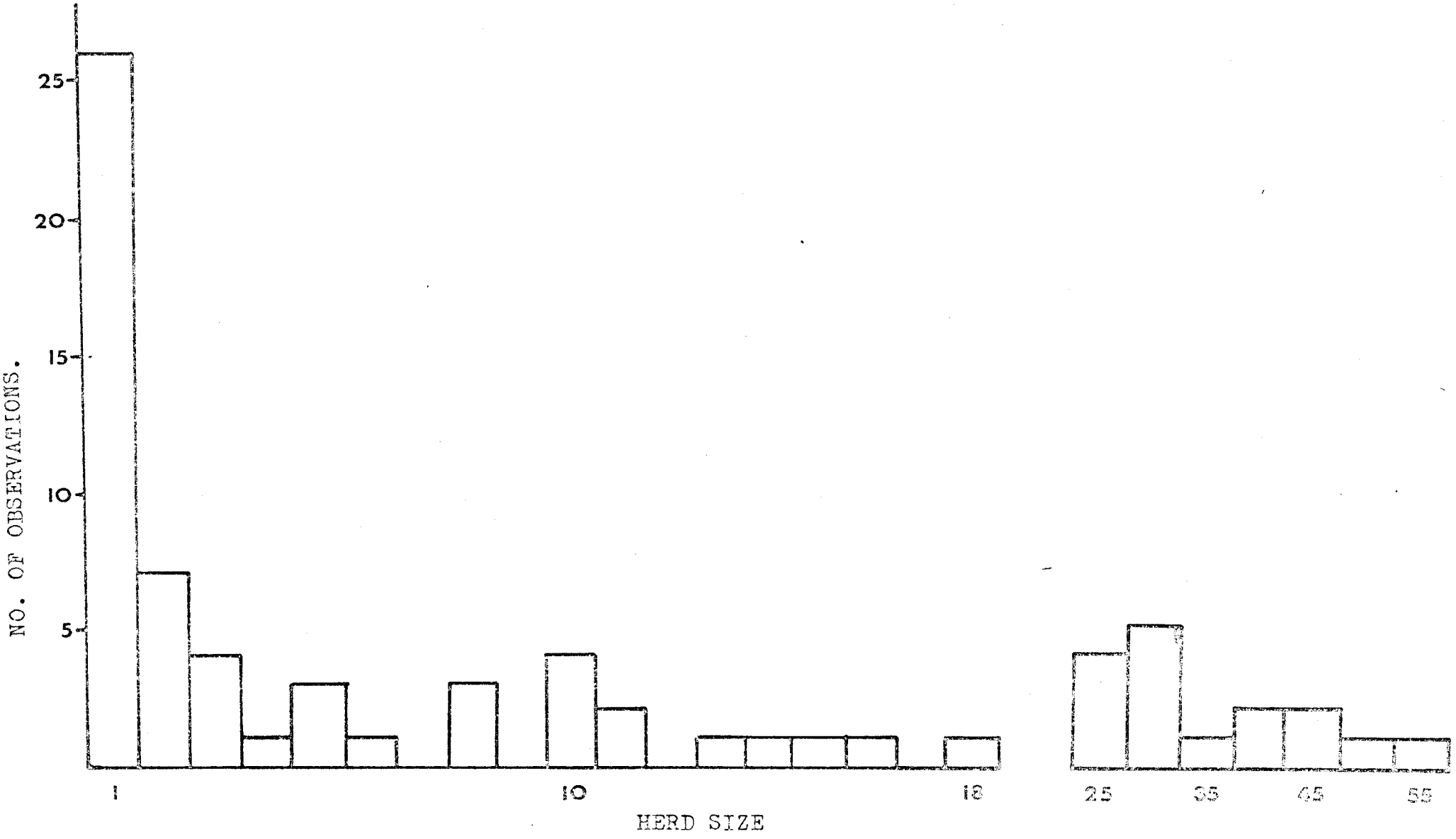


FIG. XI: ELEPHANT

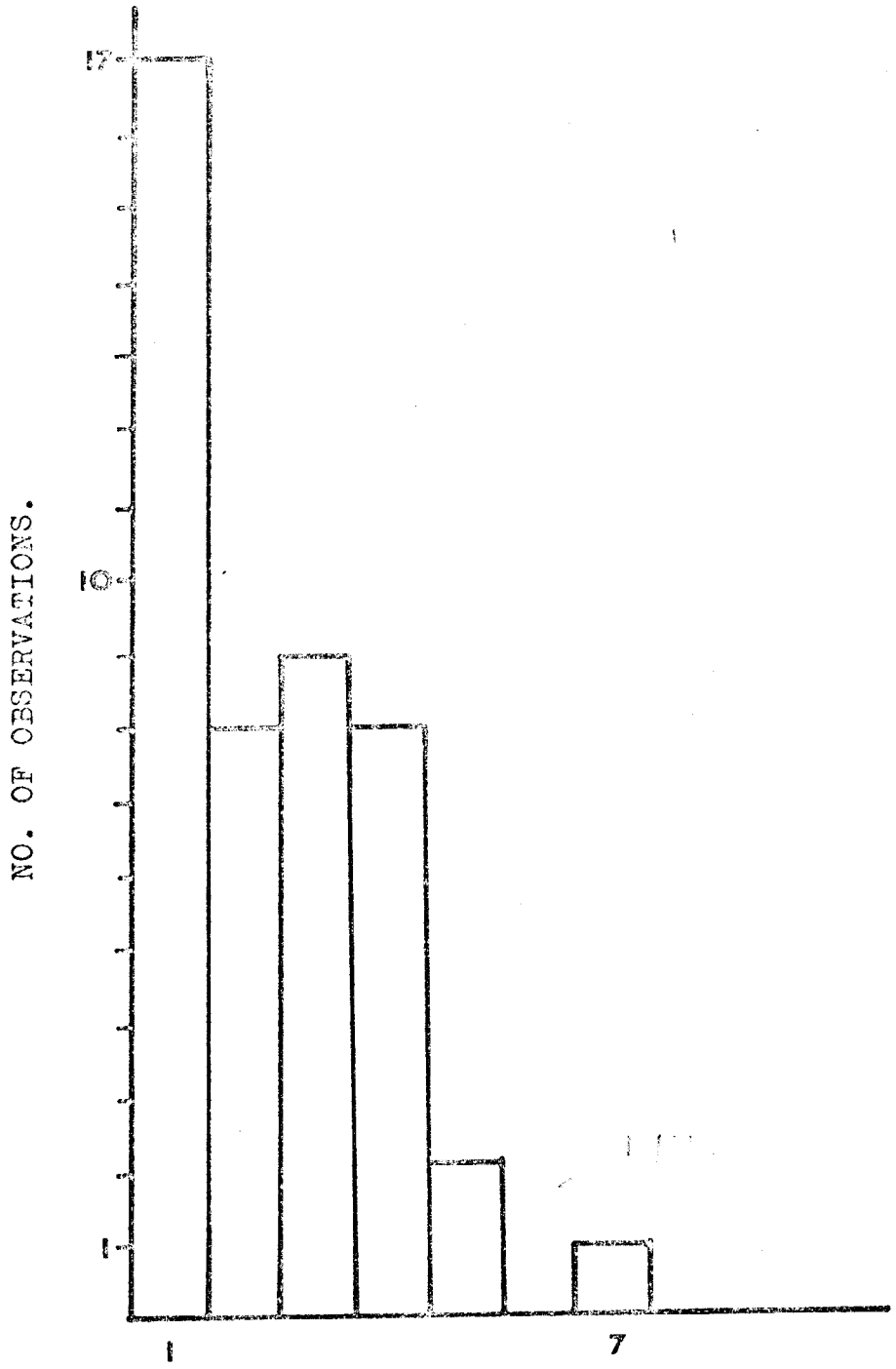


FIG. XII: WARTHOG

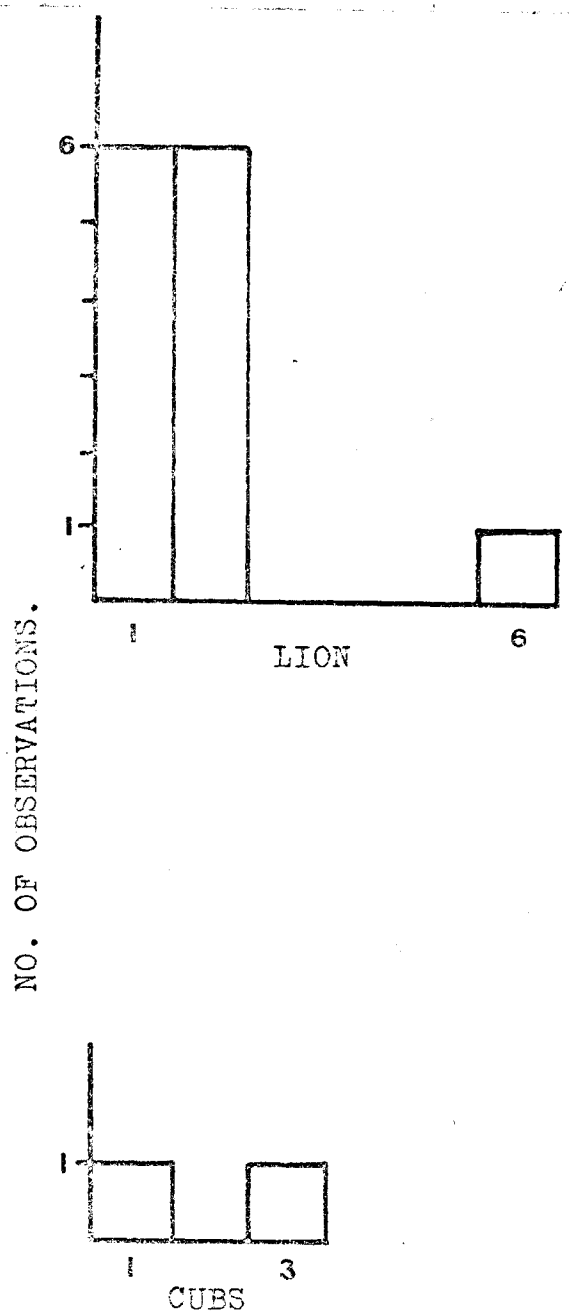
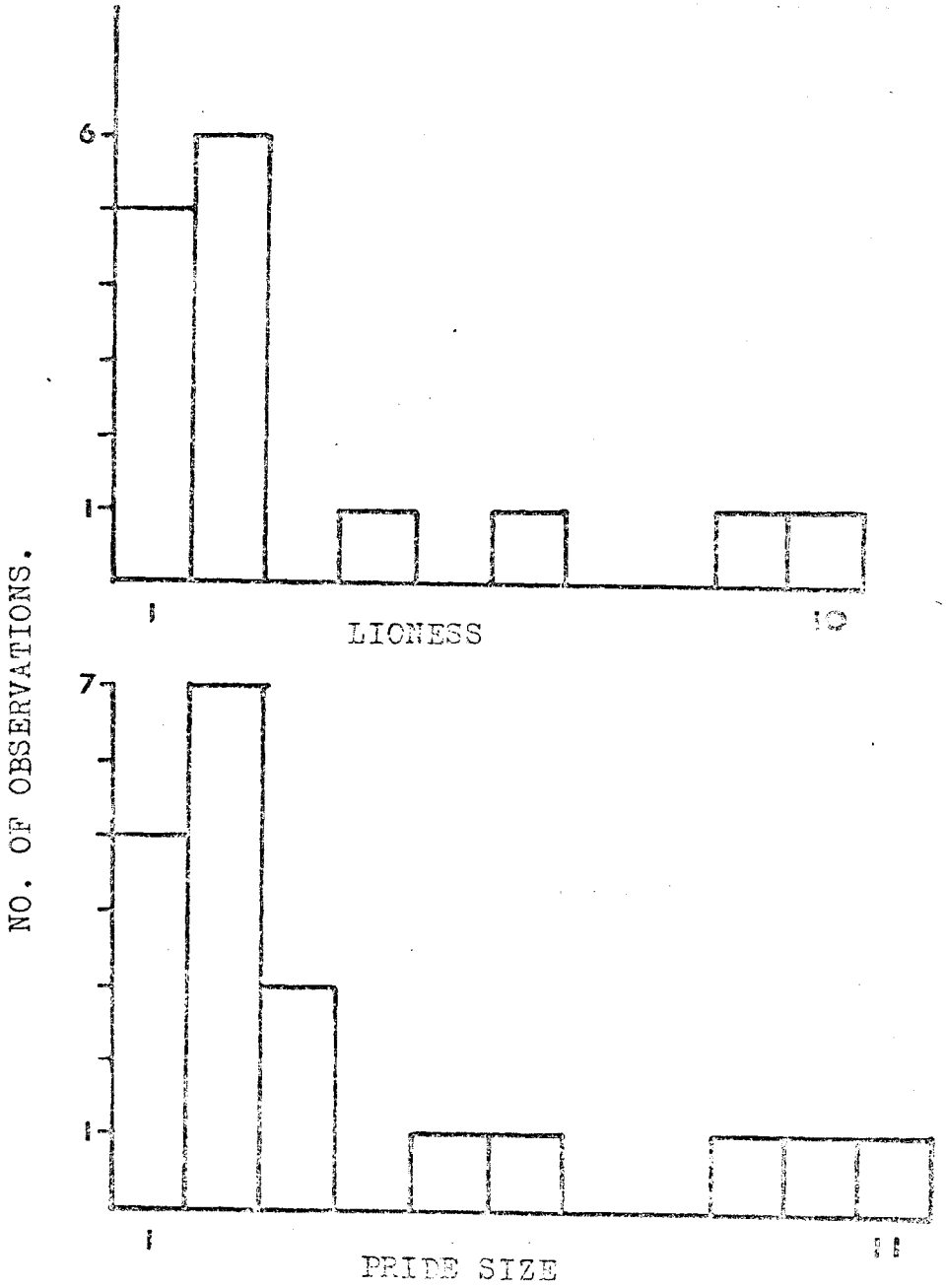


FIG. XIII: LION



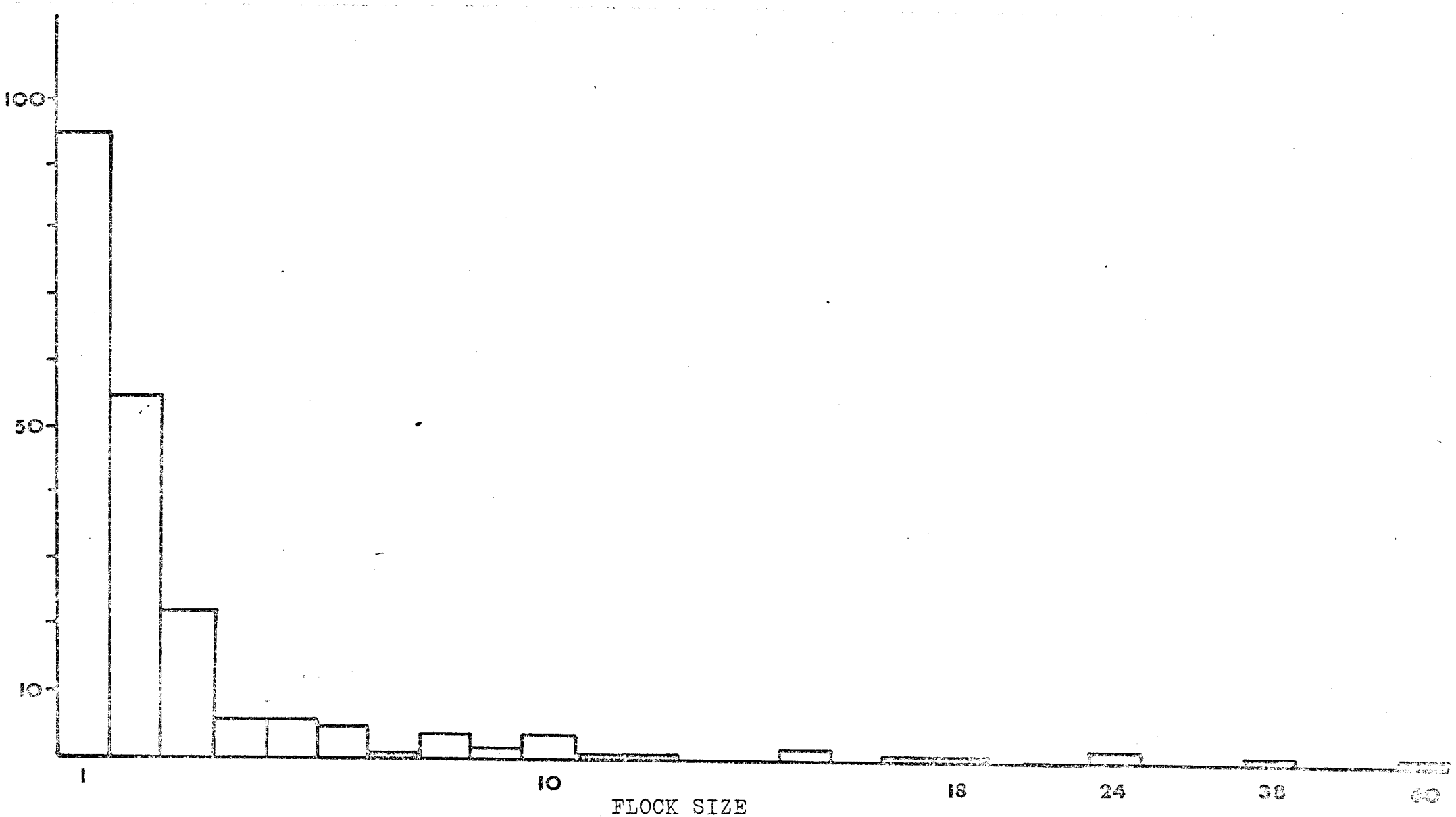


FIG. XIV: OSTRICH.

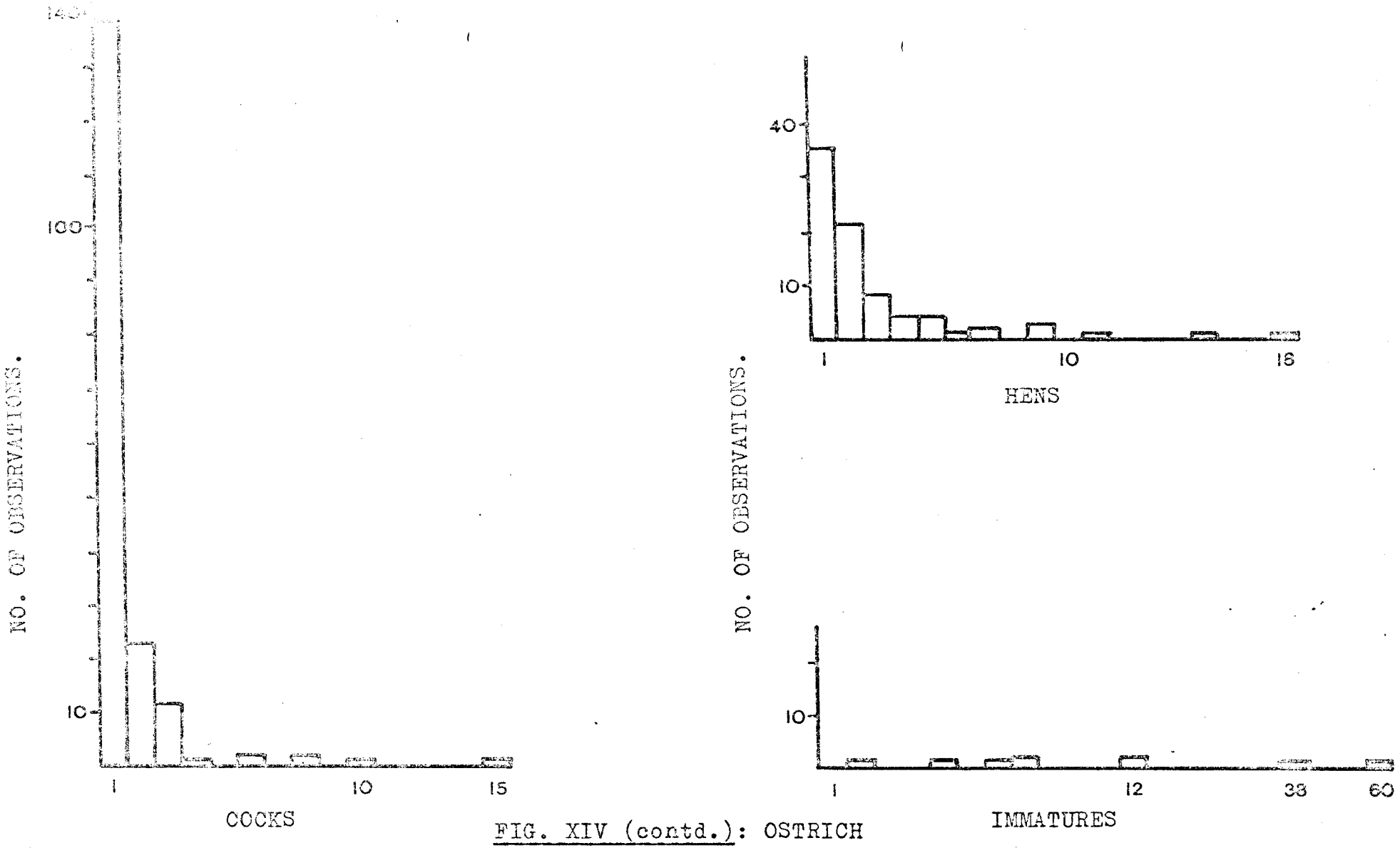


FIG. XIV (contd.): OSTRICH