

# **Economic analysis of nomadic livestock operations in northern Saudi Arabia**

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## **Synopsis**

The economic consequences of changes to the pastoral system in Saudi Arabia are the subject of this study. It presents economic analyses, including investment, production rates, off-take, income and expenditures and the returns to nomadic pastoralists.

## **Key Points**

1. Traditional nomadism as a production system no longer exists in Saudi Arabia. Dependency on range forage as a basic feed resource has declined from 100 to less than 20%. Nomadic movements have been mechanized and operations commercialized.
  2. A great shift from traditional camel-rearing to sheep-raising took place. Herd sizes increased manifold to suit the new economic conditions. Expansion in the sizes of production operations, in addition to other social changes, resulted in a growing demand for foreign labour.
  3. The new system of mechanized nomadism requires high levels of capital investments and cash to run livestock enterprises. Production levels are generally low. The availability of cheap barley feed, machinery and labour expenses will be the most important factors determining production expenses. These factors tend to favour large-size operations for economy of scale. In determining the size of a viable unit that can support a nomadic family, the social traditions must be considered.
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## **1. INTRODUCTION**

Traditional nomadism as a production system no longer exists in Saudi Arabia. Dependency on range forage as a basic feed resource has declined from 100 to less than 20%. Nomadic movements have been mechanized and operations commercialized. This paper presents the results of field-work among 11 groups of nomadic pastoralists, and analyzes the economics of their operations.

## **2. Methodology**

A sample of 11 nomadic operations were selected, comprising; five Naimi and four Najdi sheep operations and two camel operations. Flock sizes varied from 350 to 3 600 heads

for Naimi, and from 122 to 203 for Najdi operations. Camel herd sizes were 65 and 112 heads. The Widyan and gravel plains of the Hamad were the main grazing areas of the Naimi operations while the deep sand dunes of the Nafud were the main grazing areas of the Najdi sheep and camels.

Primary data were obtained at the beginning of the survey on investments and management resources used in each individual operation. Data on production rates, expenses and returns were recorded on a monthly basis for each operation for a complete year. Management practices and production problems were also considered.

### **3. Results**

Tables 28.1 to 28.4 present details and summaries of investments, production rates, off-take, income, expenses and returns of nomadic livestock operations.

Depending on flock size, the estimated value of investments per operation ranged from SR 288 534 to 1 893 050 for Naimi; 87 225 to 153 700 for Najdi; and from SR 406 000 to 1 084 750 SR for camel operations. Investments in animals varied from 43 to 90% of total invested capital in sheep operations, compared from 63 to 100% in camel operations. Investments in machinery (mainly vehicles) was also significant and range from 6 to 41%. Total investments per head ranged from SR 525 to 896 for sheep, and from SR 6 246 to 9 685 for camels.

Based on the number of lambs born alive per 100 mature ewes in the flock at the beginning of the year, lamb crop varied from 63 to 90 for Naimi, and from 102 to 152 for Najdi. Calf crop in camel operations varied from 16 to 28. Although the lamb crop in Najdi operations was boosted up by the high kidding rates of goats, which constituted 10 to 25% of the Najdi flocks, the production rates in Najdi operations were still higher than in the Naimi. Death losses were higher in ewes (8% average) relative to younger animals in all sheep operations. This high mortality rate in breeding ewes could be one of the emerging problems of heavy dependency on barley feeding. Lamb mortality and abortion rates were generally low (less than 5%), except in two of the operations where one operator lost 56% of his lamb crop as a result of an outbreak of foot-and-mouth-disease, while the other suffered a 12% abortion rate because of sheep-pox infection.

The number of animals removed from the herd for sale or home consumption was high. Percentage off-take varied from 8 to 29% for ewes, and from 15 to 71% for yearlings and lambs. Percentage off-take in camels varied from 11 to 41% for young animals, and from 0 to 20% for breeding females.

Receipts from animal sales, the value of animals consumed at home and the increase in herd inventory were the main components of gross income from nomadic operations.

Livestock sales were the main source of cash income for the nomadic families, but some operators received additional income by working as security guards or at other outside employment in the government service. Gross income varied from SR 35 350 to 94 540 in the Najdi operations; SR 58 950 to 712 449 in the Naimi operations; and from 5 400 to 127 000 in camel operations. The value of animals slaughtered and consumed at home constituted an important part of gross income in the small operations (up to 26%). The value of home consumption varied from SR 6 800 to 40 000 in sheep operations.

Data on expenses included: (i) feed costs; (ii) livestock purchases and other expenses; (iii) machinery-operating expenses; (iv) hired labour; (v) other miscellaneous costs; and (vi) non-cash costs (depreciation on machinery and equipment, tents and decrease in inventory). Cash expenditures varied from SR 14 151 to 43 792 in Najdi operations; SR 49 425 to 175 060 in Naimi operations; and SR 0 to 58 160 in camel operations. Feed, machinery and labour expenses were the most important production expenses and constituted from 95 to 90% of total production costs. These three items were about equally important in Naimi operations, but feed costs gained more importance relative to the other costs in large operations. In Najdi operations, labour was a minor expense.

Feed costs in Naimi operations varied from SR 13 766 to 84 562, and constituted 22 to 41% of total production expenses. Cash machinery expenses varied from SR 13 419 to 34 738, and constituted (with depreciation 31) to 39% of total production expenses. Labour expenses varied from SR 21 600 to 54 100, and constituted 26 to 34% of total production expenses.

In Najdi operations, feed costs varied from SR 4 980 to 11 032, and constituted 28 to 57% of total production expenses. Machinery costs varied from 3 980 to 8 744 SR, and constituted 33 to 51% of total production expenses. Labour costs varied from 0 to 3 500 SR and constituted 0 to 15% of total production expenses.

Total production expenses per head varied from SR 58 to 180 in Naimi operations; SR 103 to 171 in Najdi; and from SR 0 to 589 in camel operations.

Net earnings were positive for all sheep operations, except one Naimi operation which lost 56% of its lamb crop as a result of foot-and-mouth-disease. Both camel operations resulted in net losses.

Net earnings from Najdi operations ranged from SR 9 326 to 46 208 and net income of SR -674 to 36 146. The difference between net earnings and net income reflects the importance of the value of home consumption in these small operations. Net earnings from Naimi operations ranged from SR 15 609 to 504 478 and the net income from SR 8 809 to 464 208. Net earnings per head varied from SR 61 to 269 in Najdi operations, and from SR 45 to 140 in Naimi operations.

After subtracting the value of family labour and operator's management from net earnings, the rate of return to capital varied from -3 to 22% for Naimi operations; -2 to 39% for Najdi; and -5 to -9% for camel operations.

According to family budgets obtained from nomadic operators, a family in the Nafud area required from 6 000 to 10 000 SR per year to meet cash living expenses, while those in the Hamad required twice this amount (SR 12 000 to 20 000). Since net income per operation shows the amount which is available for family living expenses, only five of the eleven studied operations provided sufficient net incomes to meet family living expenses.

The four sheep operations that produced insufficient net income levels were small-size operations with less than 500 heads. Due to the generosity and social traditions among Bedouin, the number of animals slaughtered and consumed at home were more than necessary for subsistence. The estimated average amount of meat consumed by a nomadic family was 568 kg; that is, a meat consumption per capita of 63 kg, compared to the national red meat consumption per capita of 28 kg. This high consumption rate of meat, dictated by social traditions, reduced cash-income levels in the small nomadic operations and available income per family living expenses.

#### **4. Conclusions**

In general, the new system of mechanized nomadism requires high levels of capital investment and cash to run livestock enterprises. Production was generally low in Naimi operations. The availability of cheap feed barley, machinery and labour will be the most important factor determining production expenses. These factors tend to favour large-size operations for economy of scale. In determining the size of a viable unit that can support a nomadic family, the social traditions must be considered.

#### **References**

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**Table 28.1 Investments in nomadic livestock operations**

<i>Naimi operations</i>			<i>Najdi operations</i>				<i>Camel operations</i>	
<i>Flock sizes</i>			<i>Flock sizes</i>				<i>Herd sizes</i>	
660 heads SR	1200 heads SR	3600 heads SR	122 heads SR	128 heads SR	152 heads SR	203 heads SR	65 heads SR	112 heads SR
225,000	450,000	1,250,000	16,000	40,000	32,000	60,000	-	-
80,000	126,000	481,000	16,000	9,000	24,500	21,000	-	-
10,000	20,000	24,000	500	1,400	1,600	1,500	-	-
<b>315,000</b>	<b>596,000</b>	<b>1,755,000</b>	<b>32,500</b>	<b>50,400</b>	<b>58,100</b>	<b>82,500</b>	-	-
-	-	-	3,750	4,000	-	-	-	-
-	-	-	3,900	1,620	-	-	-	-
-	-	-	350	350	-	-	-	-
-	-	-	<b>8,000</b>	<b>5,970</b>	-	-	-	-
-	-	-	-	-	-	-	320,000	560,0
-	-	-	-	-	-	-	24,000	21,0
-	-	-	-	-	-	-	30,000	30,0
-	-	-	-	-	-	-	12,000	33,0
-	-	-	-	-	-	-	20,000	10,0
-	-	-	-	-	-	-	<b>406,000</b>	<b>654,0</b>
-	-	-	-	-	-	-	-	-
1,200	1,200	1,800	-	-	-	-	-	-
<b>1,200</b>	<b>1,200</b>	<b>1,800</b>	-	-	-	-	-	-
70,000	90,000	90,000	-	-	35,000	30,000	-	220,0
-	30,000	-	-	-	-	-	-	135,0
-	-	-	32,000	20,000	34,000	33,000	-	29,0
21,000	15,000	23,000	-	-	-	-	-	-
580	1,040	3,250	725	1,570	1,050	200	-	7
<b>91,580</b>	<b>136,040</b>	<b>116,250</b>	<b>32,725</b>	<b>21,570</b>	<b>70,050</b>	<b>63,200</b>	-	<b>384,7</b>
10,000	26,000	20,000	14,000	9,350	8,000	8,000	-	16,0
<b>417,780</b>	<b>759,240</b>	<b>1,893,050</b>	<b>87,225</b>	<b>87,290</b>	<b>136,150</b>	<b>153,700</b>	<b>406,000</b>	<b>1,054,7</b>

**Table 28.2 Investments per head of animal in semi-nomadic operations**

Item	<i>Naimi operations</i>				<i>Najdi operations</i>				<i>Camel operations</i>	
	<i>Flock sizes</i>		<i>Flock sizes</i>		<i>Flock sizes</i>		<i>Flock sizes</i>		<i>Herd sizes</i>	
	124 heads	311 heads	127 heads	153 heads	103 heads	SR/head	%	SR/head	%	
	SR/head	%	SR/head	%	SR/head	%	SR/head	%	SR/head	%
<b>Livestock</b>	483.9	55.9	501.6	38.8	366.9	39.2	454.4	46.9	5,388.3	83.1
<b>Machinery and Equipment</b>	349.8	40.4	768.5	59.5	481.9	51.5	514.4	53.1	1,017.5	15.7
<b>Dwellings</b>	32.3	3.7	22.5	1.7	86.6	9.3	-	-	77.7	1.2
<b>TOTAL</b>	<b>866.0</b>	<b>100.0</b>	<b>1,292.6</b>	<b>100.0</b>	<b>935.4</b>	<b>100.0</b>	<b>968.8</b>	<b>100.0</b>	<b>6,483.5</b>	<b>100.0</b>

Source: MAW

Table 28.3 Herd structure, production rates and off-take in nomadic livestock operations

Item	Naimi operations					Najdi operations			Camel operations		
	Flock sizes					Flock sizes			Herd sizes		
	350 heads	500 heads	660 heads	1200 heads	3600 heads	122 heads	128 heads	152 heads	203 heads	65 heads	112 heads
	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
Breeding males: Females ratio *	1 : 28	1 : 88	1 : 45	1 : 45	1 : 83	1 : 28	1 : 32	1 : 40	1 : 43	1 : 40	1 : 18
Percentage of breeding ewes in the herd	80	69	68	75	69	45	75	53	64	62	63
Percentage of weaner lambs for replacement & herd growth	17	30	30	23	30	45	23	46	34	37	34
Percent of lamb (kid/calf) crop **	76	72	90	63	77	152	129	135	102	28	16
Twining rate	4	1	3	1	-	36	14	1	6	-	-
<b>Percent of Death losses:</b>											
Ewes (Dams)	6	9	10	6	2	4	6	16	7	3	3
Weaner lambs (calves)	3	0	0.7	2	0.1	0	1	6	11	0	0
Suckling lambs (calves)	4	56	4	2	2	0	3	5	7	0	0
Abortion	0.4	0.6	3	12	0.1	0	3	0	4	0	0
<b>Percent off-take: +</b>											
Ewes (Dams)	25	29	16	26	8	9	11	0	16	0	20
Yearlings and lambs (Calves)	33	15	20	41	31	26	71	25	30	11	41

\* Only mature breeding females were included.

\*\* Lamb crop is defined as the number of lambs (kids/calves) born alive as a percent of mature breeding ewes (dams)

+ Off-take is the number of animals removed from the herd and sold or consumed.

**Table 28.4. Summary of investments, gross income, expenses, net returns and rate of returns to capital invested in nomadic operations**

Item	<i>Naimi operations</i>					<i>Najdi operations</i>				<i>Camel operations</i>	
	<i>Flock sizes</i>					<i>Flock sizes</i>				<i>Herd sizes</i>	
	350 heads	500 heads	660 heads	1200 heads	3600 heads	122 heads	126 heads	152 heads	203 heads	65 heads	112 heads
	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR	SR
<b>Total investments</b>	288,534	337,230	417,780	759,240	1,893,050	87,225	87,290	136,150	153,700	406,000	1,084,750
<b>Gross income</b>	78,610	58,950	154,160	306,864	712,444	94,540	47,630	35,350	48,470	5,400	127,000
<b>Total expenses</b>	63,001	114,771	94,384	222,751	207,971	48,332	21,884	28,224	20,841	26,400	170,458
<b>Net returns</b>	15,609	(55,821)*	59,975	84,113	504,478	46,208	25,746	9,629	27,629	(21,000)*	(43,468)*
<b>Value of family labour</b>	24,000	24,000	12,000	24,000	72,000	12,000	12,000	12,000	12,000	24,000	12,000
<b>Return to capital</b>	(8,391)*	(79,821)*	47,000	60,000	432,478	34,208	13,746	(2,674)*	(15,629)*	(35,000)*	(55,468)*
<b>Rate of return to capital</b>	(2.9%)*	(23.7%)*	11.20%	7.90%	22.80%	39.20%	15.70%	(2%)*	10.20%	(8.6%)*	(5.1%)*

\* indicates negative value

Source: MAW