
EXPERIMENT 2 DERIVATION OF COST AND SUPPLY FUNCTIONS FOR LIVESTOCK PRODUCTS AND BY-PRODUCTS

Structure

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2.0 OBJECTIVES

After exposure to this experiment, you will be able to:

- estimate production cost of a model livestock species;
- determine the merchandizing cost of market slaughter goats and their meat as well as by-products;
- calculate per cent sale value of slaughter products to live animal price; and
- prepare bank loan repayment schedule.

2.1 INTRODUCTION

Economics of a livestock enterprise is based on the cost and supply functions of the principal products and by-products. For the derivation of these functions, the idea of productivity of farm animal and needed infrastructure that reflects in capital investment and recurrent expenditure is needed. These will be incorporated to calculate the cost of production. The production potential of a particular livestock and the way in which its products and by-products are best utilized gives the desired profit.

As far as livestock species are concerned, goat is one of the most common meat species in Indian context. In this exercise, we shall see the production cost of goat in a scientifically running farm and the income accrued from the utilization of this animal at market slaughter age. The data is applicable in general context in India and may not be true at each and every place. Moreover, it requires assumption of some techno economic parameters.

2.2 TECHNO ECONOMIC PARAMETERS

Attribute	Explanation
Unit size	100 goats + 5 Bucks
System of rearing	Semi-intensive system
Unit cost	Rs. 2,65,000
Bank loan	Rs. 2,25,000
Margin money at 15%	Rs. 40,000
Repayment period	6 yrs including 1 year grace period
Interest rate	13.5%

These will be clear from 2.3.1 capital investment of goat enterprise

A) Production Norms

i) Age at Maturity (months)	10 to 15
ii) Kidding interval (months)	8
iii) Kidding (% including twinning)	120
iv) No. of kiddings	Three (3) in two years
v) Sex ratio	1:1
vi) Mortality (%)- Adults	5
vii) Mortality (%)- Kids	10
viii) Age of female kids added to stock (months)	9
ix) Milk yield per lactation per doe (litres)	20
x) Saleable age of fattened kids (months)	5
xi) Culling percentage from 3rd year onwards (%)	30

B) Expenditure Norms

i) Space requirement (sq. ft. per head)	
Female	10
Male	20
Kid	4
Thatched shelter with chain linked fencing around the Flock at Rs./sqft.	20
ii) Chaff cutter to cut and feed the fodder (Rs.)	5000
iii) Cost of feed and water troughs (Rs./animal)	
Adult	20
Kid	10
iv) Fodder cultivation	
Number of acres for 100 goats	2
Cost of fodder cultivation (Rs./Acre/Season)	1500

v) Concentrate (gms/day/animal)	
Does - One month before kidding and one month after kidding	200
Bucks - One month before breeding season for two breeding seasons	250
Kids - 3rd week to 5 months	41kg/Kid
Cost of concentrate (Rs./kg)	5
vi) Labour No.	1
Labour wages (Rs. per month)	1000
vii) Insurance (%) (of the cost of breeding stock)	6%
viii) Veterinary aid (Rs./head/year)	
Adult	20
Kid	10
ix) Electricity and water expenses (Rs./adult)	10
x) Unit cost of animals (Rs./animal)	
Female	1500
Male	2000

C) Income Norms

i) Sale price (Rs./animal)	
Fattener	1000
Culled animal	1000
ii) Sale of manure (Rs./animal/annum)	
Adult	20
Fattener	10
iii) Cost of milk (Rs./litre)	5
iv) Sale of gunny bags (Rs./bag)	5
v) Value of closing stock (Rs.)	
- Doe	1500
- Buck	2000
- Kid	1000

D) Banking Norms

i) Margin money (%)	15
ii) Interest rate (%)	13.5
iii) Repayment period (including one year grace period)	6
iv) Depreciation on Sheds and Equipments (%)	10

2.3 PRODUCTION COST OF GOAT

If a farm is started with the 100 Does and 5 Bucks, the flock strength that most probably prevail in successive years are follows:

Years	1	2		3	4		5	6	
Kidding No.	I	II	III	IV	V	VI	VII	VIII	IX
A. Opening stock									
Adult bucks	5	5	5	5	5	5	5	5	5
Does	100	95	100	100	100	100	100	100	100
B. Birth during the year									
Birth during the year	120	114	120	120	120	120	120	120	120
Male kid	60	57	60	60	60	60	60	60	60
Female kid	60	57	60	60	60	60	60	60	60
C. Mortality									
Adult @ 5%	5	0	5	5	0	5	5	0	5
Male Kids @ 10%	6	6	6	6	6	6	6	6	6
Female Kids @ 10%	6	6	6	6	6	6	6	6	6
D. Sale during the year									
Adults culled	0	0	0	30	0	30	30	0	30
Male kids	0	51	54	54	54	54	54	54	54
Female kids	0	46	49	19	54	19	19	54	19
E. Closing stock at the end of the year									
Adult-males	5	5	5	5	5	5	5	5	5
Adult-female	95	95	95	65	100	65	65	100	65
Male kids	54	51	54	54	54	54	54	54	54
Female kids	54	51	54	54	54	54	54	54	54
F. Female Kid Transferred to Flock									
	0	5	5	35	0	35	35	0	35

Note: Following figures have been used in formulation income/expenditure statement.

	1	2	3	4	5	6
1. No. of kids sold as fatteners	0	200	73	181	73	181
2. No. of culled and sold animals	0	0	30	30	30	30
3. No. of lactating animals	85	85	85	85	85	85
4. Total adults in year	105	105	105	105	105	105
5. Total kids in year (Closing stock)	108	210	108	216	108	216

Taking into consideration 120% kidding and 105 kid per year 85% of the does have been considered always in milking in all years.

Culling in male is carried out by replacement from other flocks to avoid in breeding. The number is kept constant in all the years.

2.3.1 Capital Investment on Goat Enterprise

Derivation of Cost and
Supply Functions for
Livestock Products and
By-Products

S. No.	Items	Specifications	Physical Units	Unit Cost (Rs./Unit)	Total Cost (Rs.)
1.	Shed	Does - 10 sft./doe for 100 does	1000	20	20000
		Buck - 20sft./buck for 5 bucks	100	20	2000
		Kids - 4 sft./kid for 120 kids	480	20	9600
2.	Chaff Cutter	Lumpsum	1	5000	5000
3.	Feed and Water trough for Adult	Per head basis	105	20	2100
4.	Feed and Water trough for Kid	Per head basis	120	10	1200
	Shed and Equipments				39900
5.	Cost of animals	Does	100	1500	150000
		Buck	5	2000	10000
6.	Insurance	Does - @ 6% of the cost of the animal	100	90	9000
		Buck	5	120	600
7.	Veterinary aid	Adult	105	20	2100
		Kids	120	10	1200
8.	Fodder Cultivation	For two acres for three seasons	6	1500	9000
9.	Supplementary Feed	Conc. requirement (in kgs) for two months for 85 does	1020	5	5100
		Conc. requirement (in kgs) for two months for 5 bucks	75	5	375
		Conc. requirement (in kgs) for 120 kids for one cycle	4920	5	24600
10.	Labour wages	1 labour at Rs. 1000/month	12	1000	12000
11.	Electricity and water expenses		105	10	1050
	Total Cost				264925
				Say	265000
	Margin money @15% of total cost				40000
	Bank Loan @85% of total cost				225000

2.3.2 Goat Rearing: Cash Flow Analysis (Rs.)

	Particulars	Ist year	2nd year	3rd year	4th year	5th year	6th year
A.	Benefits						
1.	Sale price of fatteners	0	200000	73000	181000	73000	181000
2.	Sale price of culled animals	0	0	30000	30000	30000	30000
3.	Sale price of milk @ 20/litres/ animals/lactation	8500	8500	8500	8500	8500	8500
4.	Manure Sale from adult	2100	2100	2100	2100	2100	2100
5.	Manure Sale from kids	1080	2100	1080	2160	1080	2160
	Total income	11680	212700	114680	223760	114680	223760
6.	Value of closing stock (5 Buck+ 100 does + 216 Kids)						376000
	Total Benefits	11680	212700	114680	223760	114680	599760
B.	Cost						
1.	Capital Cost	265000					
2.	Recurring Cost						
I	Feed Cost						
a.	Fodder cultivation	0	9000	9000	9000	9000	9000
b.	Concentrate Feed	0	5100	5100	5100	5100	5100
c.	Concentrate Feed	0	375	375	375	375	375
d.	Conc.Feed	0	41000	14965	37105	14965	37105
	Sub Total	0	55475	29440	51580	29440	51580
II	Labour		12000	12000	12000	12000	12000
III	Medicine/ Vaccination						
	Adult	0	2100	2100	2100	2100	2100
	Kid	0	2100	1080	2160	1080	2160
	Sub Total	0	4200	3180	4260	3180	4260
IV	Insurance	0	9600	9600	9600	9600	9600
V	Miscellaneous Expenses	0	1050	1050	1050	1050	1050
VI	Depreciation value of shed and equipments		3990	3990	3990	3990	3990
	Total Cost	265000	86315	59260	82480	59260	82480
C.	Gross Surplus	11680*	126385	55420	141280	55420	133760

* Capital cost will come from bank loan and margin money.

2.3.3 Repayment Schedule

Year	Income	Expenditure	Gross Surplus	Repayment			Net Surplus
				Interest	Principal	Total	
1	11680	0	11680	0	0	0	11680
2	212700	86315	126385	30375	70000	100375	26010
3	114680	59260	55420	20925	20000	40925	14495
4	223760	82480	141280	18225	70000	88225	53055
5	114680	59260	55420	8775	30000	38775	16645
6	223760	82480	133760	4725	35000	39725	94035

Note: In the first year, no recurring expenses are considered as entire expenditure is capitalized.

Now, cost of production of an animal sold for slaughter can be calculated by (animals sold by second year onwards) reducing other income sources to the total cost. The cost of production figure indicates that the surplus animals that are sold for meat purpose virtually have no cost of production. The positive sign indicates that costs of these animals are satisfied by the by-products as milk, manure and appreciation of kids. But these animals are charged Rs.750 to 1000 as per the sex and body weight as well as conformation.

2.4 SALE VALUE OF GOAT MEAT AND BY-PRODUCTS

Goat is generally marketed individually whereas sheep are traded in lots of 10 to 20 animals of similar conformation and weight groups.

Usually, all the edible offals are disposed to the customers on the floor of the slaughter house. Head is sold individually. Forefeet and hind feet are sold in pairs and separately. Pluck is usually separated into three parts- lungs and spleen, heart and liver and disposed individually. Sometimes, it is sold as whole pluck. Heart and liver are sold at par with meat. Intestinal tract and rumen as well as reticulum are sold together whereas omasum and abomasums are sold together. Udders are sold separately.

Skin is the only non-edible offal from small ruminants. These are sold to skin merchants by bargains.

Per cent Yields of Slaughter Components of Market Slaughter Goats under Two Age Groups

Components (%)	Young	Adults
Blood	4.2	4.4
Forefeet	1.8	1.5
Hind feet	1.3	1.1
Head	7.0	7.2
Skin	8.5	7.7
Intestinal tract	7.2	7.7
Omental fat	1.8	2.0
Rumen and reticulum	14.3	14.5
Omasum and abomasum	2.3	2.4
Pluck	4.1	4.2
Carcass	47.5	47.3

Merchandizing Value of Market Slaughter Goats under Two Groups

Items	Young	Adult
Sale Value (Rs.)		
Live animals	800	1000
Skin	30	35
Head	45	45
Forefeet	20	20
Hind feet	10	10
Intestinal rumen and reticulum	30	35
Omasum and Abomasum	5	5
Lung + spleen	15	15
Liver + Heart	45	60
Sum of by-products	200	225
Meat	850	1050
Total sale proceeds	1050	1275
Sale Value of Slaughter Products to Total Sale Proceeds (%)		
Skin	2.86	2.75
Head	4.29	3.52
Forefeet	1.90	1.57
Hind feet	0.95	0.78
Intestine, rumen and reticulum	2.86	2.75
Omasum and Abomasums	0.28	0.39
Lung + spleen	1.43	1.18
Liver + Heart	4.29	4.70
Sum of byproducts	19.05	17.65
Meat	80.95	82.35
Sale Value of Slaughter Products to Live Animals Price (%)		
Skin	3.75	3.50
Sum of by-products	25.00	22.50
Meat	106.3	105.00
Total sale proceeds	131.25	127.50

Inference

It can be observed that sale price of adult is higher than young. Sale value of skin, liver and sum of by-products is also higher in adults than younger animals. Sale value of meat is significantly higher in adult as compared to young.

Sale value of slaughter products expressed as percentage of total sale proceeds reveals that sale value of all offals is higher in young than adults excepting pluck and omasum plus abomasums. The forefeet and hind feet of young animals are preferred.

It could be noticed from the sale value of slaughter products expressed as a per cent of live animal price that sale value of meat and total sale proceeds was higher in young than adult animals.

2.5 ACTIVITY

Estimate the production cost of sheep and prepare bank repayment schedule for a farm starting with 100 ewes and 5 rams. Consider that the bank loan has to be repaid within 6 years.