Indian Journal of Hill Farming, (2025); 38(2):55-61.
doi: 10.56678/iahf-2025.38.02.9
ISSN: 0970-6429
ijhfonline.org

RESERCAH ARTICLE

Estimation of the Cost of Production of Pig Farming under the KVK Operating Villages of Assam

Debajit Deka*, DhireswarKalita, Rabindra Nath Goswami, Arundhati Phookan

Abstract

Data pertaining to the estimation of the cost of production in fatteners and breeding units of pigs under field conditions were collected from 45 pig farms maintained under Krishi Vigyan Kendra (KVK) operating villages of Baksa district of Assam. Genetic groups (HD-K75, HD-K75 X Ghoongroo and Ghoongroo) and systems of rearing (intensive, semi-intensive and tethering) had a significant effect on variable cost, fixed cost, gross cost, total return and net return in fatteners and breeding units of pigs. The overall gross costs in fatteners' unit were Rs 9942.83 ± 347.79, 9566.07 ± 230.29 and 9296.72 ± 175.90 in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs, respectively, with an overall population mean of Rs 9558.80 ± 141.38. In the breeding units, corresponding values were Rs 27888.67 ± 490.38, 26990.00 ± 511.75 and 24977.78 ± 341.36 with an overall population mean of Rs 26424.76 ± 310.26. In intensive, semi-intensive, and tethering systems of rearing in fatteners unit, the overall mean gross costs were Rs 10385.47 ± 130.81, 9861.93 ± 122.99 and 8429.00 ± 98.40, respectively. In breeding units, the respective values were Rs 27777.20 ± 514.50, 26533.73 ± 398.79 and 24963.33 ± 447.00. The overall net return per kg of live weight in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs belonging to fatteners were Rs. 42.75 ± 4.33, 39.59 ± 3.91 and 32.38 ± 3.24, respectively and the overall population mean was Rs. 37.55 ± 2.22. The overall total return in intensive, semi-intensive and tethering systems of rearing was found to be Rs 47.04 ± 3.04, 38.40 ± 3.29 and 27.28 ± 3.33, respectively. The overall net return per piglet in breeding units of HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs was Rs. 881.13 ± 103.15, 717.45 ± 134.27 and 661.19 ± 74.62, respectively, with overall population means of Rs. 711.66 ± 59.45. In intensive, semi-intensive and tethering system net return per piglet was estimated as Rs 784.30 ± 115.01, 704.84 ± 77.25 and 645.84 ± 87.48, respectively. The overall cost benefit ratio (C:B ratio) for fatteners in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs was 1.28 ± 0.03, 1.26 ± 0.02 and 1.18 ± 0.02, respectively and the overall population mean was 1.24 ± 0.01. In breeding units, the corresponding values were 1.34 ± 0.02, 1.24 ± 0.01 and 1.24 ± 0.02, the overall population means being 1.27 ± 0.01. In intensive, semi-intensive and tethering systems of rearing in fatteners the cost-benefit ratio was 1.31 ± 0.02, 1.25 ± 0.02 and 1.15 ± 0.02, respectively. In breeding units, corresponding averages for B:C ratio were 1.28 ± 0.02, 1.28 ± 0.02 and 1.25 ± 0.02. The cost-benefit ratio as observed in the present study clearly indicates that pig rearing is a profitable and viable enterprise even under field conditions. The findings also show that in terms of absolute return, breeding units surpass fatteners.

Keywords: Cost of production, Genetic group, System of rearing, B:C ratio, Pig.

Introduction

Like any other business, the profitability and viability of pig farming depend largely on the cost of production and the return from marketing that is the sale price of the produce. It is vital to understand the relative importance of the different cost components in deciding the gross cost and thus also the profit. In order to maximize profit by minimizing the cost of production, it is equally important to understand the role played by important factors influencing gross cost and the different cost components upon which the profit depends. Such studies in pigs reared under field conditions are limited in India. India's north-eastern state of Assam has a special place in pig husbandry. HD-K75, a variety of pig released by Assam Agricultural University, has got wide acceptance among pig rearers because of its high productivity and adaptability under field conditions. The highly prolific Ghoongroo breed of pig and even their crosses with HD-K75 are also popular. For ensuring the profitability and sustainability of these farmer-centric pig enterprises, it is felt necessary to study the economics of rearing pigs of these genetic groups under field conditions under rearing systems normally adopted by the farmers. In this context, the

Department of Animal Genetics and Breeding, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-781022

***Corresponding Author:** Debajit Deka, Department of Animal Genetics and Breeding, College of Veterinary Science, Assam Agricultural University, Khanapara, Guwahati-781022, E-Mail: debajit74@gmail.com

How to cite this article: Deka, D., Kalita, D., Goswami, R.N., Phookan A 2025. Estimation of the Cost of Production of Pig Farming under the KVK Operating Villages of Assam. *Indian J. Hill Farm.*, **38**(2):55-61.

Source of support: Nil

Conflict of interest: None.

Received: 14/05/2025 **Revised:** 02/06/2025 **Accepted:** 18/06/2025

present investigation has been conceptualized to estimate the cost of production of fatteners and breeding units of pigs belonging to three genetic groups, *viz.* HD-K75, HD-K75 X Ghoongroo and Ghoongroo were maintained under intensive, semi-intensive and tethering systems of rearing.

Material and Methods

The variable cost included the cost of total feed consumption (concentrate feed and locally available feed) during the rearing period, cost of veterinary services, labour cost, cost of electricity and water supply, bank loan interest, and animal insurance. In addition, in the case of fatteners, the price of piglets at 2 to 3 months of age and in the case of breeding units, the price of gilt and boar of 8-10 months were added to the variable cost. The fixed cost comprises annual depreciation on building, depreciation on equipment and bank loan interest on capital investment. The total return of fatteners' units was the sale price of live fatteners and empty gunny bags. The total return of breeding units was the sale price of 2 to 3 months old piglets and empty gunny bags. The insurance cost was considered 4% of the animal price. The depreciation on the building was calculated as 2% per year on the total cost of the building. The depreciation on equipment was calculated as 15% per year on the total cost of equipment (Senthilkumar and Raja, 2021). Cost and benefit ratio (C:B ratio) was estimated by dividing total return by Gross cost. Data were classified according to three genetic groups (HD-K75, HD-K75 X Ghoongroo and Ghoongroo) and three systems of rearing (intensive, semi-intensive and tethering). To study the effects of genetic groups, system of rearing and their interaction, two ways analysis of variance was carried out. (Snedecor and Cochran, 1989).

Results and Discussion

The means along with the standard errors (SE) of various parameters of cost and return estimates for fatteners and breeding units of HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs under field conditions are presented in Tables 1 and 2. The results of the analysis of variance showing the effects of genetic group and system of rearing and their interaction on various cost and return parameters are presented in Tables 3 and 4. The genetic group-wise means are combined over rearing systems, and rearing system-wise means are combined over genetic groups, unless otherwise mentioned.

Variable Cost

The averages for variable cost in fatteners units under field conditions were Rs 9267.83 ± 280.46, 8902.53 ± 175.72 and 8647.28 ± 126.22 in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs, respectively, with an overall mean of Rs 8897.84 ± 111.27. In intensive, semi-intensive and tethering systems of rearing, the system-wise mean variable costs were Rs 9435.47 ± 130.81, 9192.60 ± 118.17 and 8065.47 ± 96.56, respectively. In breeding units, variable cost was Rs 27105.33 ± 433.05in HD-K75, Rs. 26206.67 ± 461.32 inHD-K75 X Ghoongroo and Rs. 24194.45 ± 298.53 in Ghoongroo pigs. The overall mean was Rs 25641.42 ± 288.60. In intensive system, semi-intensive and tethering system of rearing, the means for variable costs were Rs 26627.20 ± 514.49, 25783.73 ± 398.79 and 24513.33 ± 446.99, respectively, in the breeding units.

Results of analysis of variance showed that there was a highly significant effect of genetic group and system of rearing on variable cost in the fatteners unit and in the breeding unit. Critical difference tests revealed that the variable cost incurred in Ghoongroo was significantly lower than that of the other two genetic groups. Also, combined over genetic groups, the intensive system had significantly higher variable costs than the other two systems of rearing. The genotype x rearing system interaction was found to be significant in fatteners. Although on an overall basis, semi-intensive and tethering systems did not differ, C.D. tests showed that within genetic groups, the variable cost in the semi-intensive system was significantly higher than the tethering system in the fatteners.

Fixed cost

The values for the components of fixed cost were the same for fatteners and the breeding units and thereby the calculated values for fixed costs in fatteners and breeding units were the same. The results are shown under fatteners head only (Table 1). The averages for fixed cost under field conditions were Rs 675.00 ± 71.91, 656.67 ± 65.80 and 649.44 ± 59, respectively, in HD-K75, HD-K75 X Ghoongroo, and Ghoongroo pigs; the overall mean combined over the three genetic groups was Rs 658.67 ± 36.77. In the intensive system, semi-intensive and tethering system of rearing, the mean fixed cost was Rs 950.0 ± 00.00, 669.33 ± 10.80 and 356.67 ± 6.67, respectively. Results of analysis of variance showed a highly significant effect of genetic group and system of rearing on fixed cost. Fixed cost was significantly lower in Ghoongroo than in the other two genetic groups. All three rearing systems differed significantly from each other ($P<0.05$). The interaction effect was not found to be significant.

Gross cost

In case of fatteners, gross cost was found to be Rs 9942.83 ± 347.79, 9566.07 ± 230.29, and 9296.72 ± 175.90, respectively, in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs. The overall average gross cost was Rs 9558.80 ± 141.38. In intensive, semi-intensive and tethering systems of rearing, the mean gross cost was Rs 10385.47 ± 130.81, 9861.93 ± 122.99 and 8429.00 ± 98.40, respectively. In breeding units, the genetic groupwise means for gross cost wererespectively Rs 27888.67 ± 490.38, 26990.00 ± 511.75 and 24977.78 ± 341.36 in HD-K75, HD-K75 X Ghoongroo

Table 1: Cost and return estimates in fatteners units of pig under field condition as per genetic groups and systems of rearing

Items	*Intensive system*		*Semi-intensive system*		*Tethering system*		*Overall*	
	Mean ± SE (N)	*CV%*	*Mean ± SE (N)*	*CV%*	*Mean ± SE (N)*	*CV%*	*Mean ± SE (N)*	*CV%*
A. VARIABLE COST								
HD-K75	$10121.75^{a} \pm 206.55$ (4)	4.08	$9658.00^{a} \pm 28.14$ (4)	0.58	$8023.75^{b} \pm 109.84$ (4)	2.74	$9267.83^{A} \pm 280.46$ (12)	10.48
HD-K75 X GHOONGROO	$9358.00^{a} \pm 28.14$ (5)	1.34	$9271.60^{a} \pm 184.98$ (5)	4.46	$8090.00^{b} \pm 196.47$ (5)	5.43	$8902.53^{A} \pm 175.72$ (15)	7.64
GHOONGROO	$9052.50^{a} \pm 84.64$ (6)	2.29	$8816.50^{a} \pm 128.10$ (6)	3.67	$8072.83^{b} \pm 185.40$ (6)	5.63	$8647.28^{B} \pm 126.22$ (18)	6.19
TOTAL	$9435.47^{A} \pm 130.81$ (15)	5.37	$9192.60^{B} \pm 118.17$ (15)	4.98	$8065.47^{B} \pm 96.56$ (15)	4.64	8897.84 ± 111.27 (45)	4.64
B. FIXED COST								
HD-K75	950.0 ± 00.00 (4)	00	700.00 ± 28.87 (4)	8.25	375.00 ± 25.00 (4)	13.33	$675.00^{A} \pm 71.91$ (!2)	36.90
HD-K75 X GHOONGROO	950.0 ± 00.00 (5)	00	670.00 ± 20.00 (5)	6.67	350.00 ± 0.00 (5)	0.00	$656.67^{AB} \pm 65.80$ (15)	38.81
GHOONGROO	950.0 ± 00.00 (6)	00	648.33 ± 1.67 (6)	0.63	350.00 ± 0.00 (6)	0.00	$649.44^{B} \pm 59.41$ (18)	38.81
TOTAL	$950.0^{A} \pm 00.00$ (15)	00	$669.33^{B} \pm 10.80$ (15)	8.25	$356.67^{C} \pm 6.67$ (15)	13.33	658.67 ± 36.77 (45)	37.45
C. GROSS COST								
HD-K75	$11071.75^{a} \pm 206.56$ (4)	3.73	$10358.00^{b} \pm 43.48$ (4)	0.84	$8398.75^{c} \pm 94.67$ (4)	2.25	$9942.83^{A} \pm 347.79$ (12)	12.12
HD-K75 X GHOONGROO	$10296.00^{a} \pm 55.83$ (5)	1.21	$9941.60^{a} \pm 188.36$ (5)	4.24	$8460.60^{b} \pm 210.42$ (5)	5.56	$9566.07^{B} \pm 230.29$ (15)	9.32
GHOONGROO	$10002.50^{a} \pm 84.64$ (6)	2.07	$9464.83^{b} \pm 126.72$ (6)	3.28	$8422.83^{c} \pm 185.39$ (6)	5.39	$9296.72^{C} \pm 175.90$ (18)	8.03
TOTAL	$10385.47^{A} \pm 130.81$ (15)	4.88	$9861.93^{B} \pm 122.99$ (15)	4.83	$8429.00^{C} \pm 98.40$ (15)	4.52	9558.80 ± 141.38 (45)	9.92
D. TOTAL RETURN								
HD-K75	$15100.00^{a} \pm 124.90$ (4)	17.72	$13377.50^{b} \pm 340.85$ (4)	17.72	$9960.00^{c} \pm 171.08$ (4)	17.72	$12812.50^{A} \pm 655.32$ (12)	17.72
HD-K75 X GHOONGROO	$13710.00^{a} \pm 156.84$ (5)	17.72	$12680.00^{b} \pm 307.25$ (5)	17.72	$9920.00^{c} \pm 213.08$ (5)	17.72	$12103.33^{B} \pm 445.57$ (15)	14.26
GHOONGROO	$12483.33^{a} \pm 242.78$ (6)	17.72	$11250.00^{b} \pm 335.41$ (6)	17.72	$9410.00^{c} \pm 328.38$ (6)	17.72	$11047.78^{C} \pm 348.12$ (18)	13.37
TOTAL	$13590.00^{A} \pm 300.70$ (15)	8.57	$12294.00^{B} \pm 297.91$ (15)	9.39	$9726.67^{C} \pm 161.84$ (15)	6.44	11870.22 ± 283.47 (45)	16.02
E.NET RETURN								
HD-K75	4028.25 ± 304.66 (4)	15.13	3019.50 ± 374.45 (4)	24.80	1561.25 ± 147.63 (4)	18.91	$2869.67^{A} \pm 341.17$ (12)	41.18
HD-K75 X GHOONGROO	3414.00 ± 133.96 (5)	8.77	2738.40 ± 285.39 (5)	23.30	1459.40 ± 274.21 (5)	42.01	$2537.27^{A} \pm 252.10$ (15)	38.48
GHOONGROO	2480.83 ± 205.24 (6)	20.26	1785.17 ± 296.95 (6)	40.75	987.17 ± 225.17 (6)	55.87	$1751.06^{B} \pm 199.13$ (18)	48.25

TOTAL	3204.53^{A} ± 204.85 (15)	24.76	2432.07^{B} ± 221.65 (15)	35.30	1297.67^{C} ± 142.65 (15)	42.58	2311.42 ± 160.49 (45)	46.58
F. NET RETURN PER KG LIVE WEIGHT								
HD-K75	57.67 ± 4.73 (4)	16.41	41.50 ± 4.42 (4)	21.29	29.10 ± 5.21 (4)	35.84	42.75 ± 4.33 (12)	35.06
HD-K75 X GHOONGROO	45.02 ± 7.25 (5)	36.02	41.94 ± 6.35 (5)	33.87	31.82 ± 6.63 (5)	46.59	39.59 ± 3.91 (15)	38.27
GHOONGROO	41.63 ± 2.92 (6)	17.17	33.23 ± 5.70 (6)	42.00	22.29 ± 5.35 (6)	58.81	32.38 ± 3.24 (18)	42.48
TOTAL	47.04^{A} ± 3.04 (15)	26.79	38.40^{A} ± 3.29 (15)	33.26	27.28^{B} ± 3.33 (15)	47.29	37.55 ± 2.22 (45)	39.68
G. B: C RATIO								
HD-K75	1.37 ± 0.03 (4)	4.88	1.29 ± 0.04 (4)	5.78	1.19 ± 0.02 (4)	3.05	1.28^{A} ± 0.03 (12)	7.41
HD-K75 X GHOONGROO	1.33 ± 0.01 (5)	2.15	1.28 ± 0.03 (5)	5.40	1.17 ± 0.03 (5)	6.62	1.26^{A} ± 0.02 (15)	7.02
GHOONGROO	1.25 ± 0.02 (6)	3.94	1.19 ± 0.03 (6)	6.43	1.12 ± 0.03 (6)	5.82	1.18^{B} ± 0.02 (18)	6.92
TOTAL	1.31^{A} ± 0.02 (15)	7.76	1.25^{B} ± 0.02 (15)	7.76	1.15^{C} ± 0.02 (15)	7.76	1.24 ± 0.01 (45)	7.76

N.B. Values within parentheses are number of observations. Sub-class means with at least one superscript in common do not differ significantly ($P<0.05$). Differences between genetic groups combined over rearing systems and differences between rearing systems combined over genetic groups are indicated by uppercase letters.

and Ghoongroo pigs, the overall mean being Rs 26424.76 ± 310.26. In intensive system, semi-intensive and tethering system of rearing, the mean gross cost in breeding units was Rs 27777.20 ± 514.50, 26533.73 ± 398.79 and 24963.33 ± 447.00, respectively. There was a highly significant effect of genetic group and system of rearing on gross cost in fatteners as well as in breeding units. C.D.tests revealed that all three genetic groups and the three rearing systems differed significantly amongst themselves. The interaction effect was found to be significant in fatteners only. In the case of fatteners, in HD-K75 x Ghoongroo, intensive and semi-intensive systems of rearing did not differ, having significantly greater means than the Ghoongroo. Moanaro *et al*.(2011) in their study under a non-conventional feeding regime reported a much lower total cost Rs 6239.00.

Total Return

The total return in HD-K75, HD-K75X Ghoongroo and Ghoongroo pigs under field conditions was Rs. 12812.50 ± 655.32, 12103.33 ± 445.57 and 11047.78 ± 348.12, respectively, in the fatteners, with an overall mean of Rs. 11870.22 ± 283.47. The total return in fatteners under intensive, semi-intensive and tethering systems of rearing was found to be Rs 13590.00 ± 300.70, 12294.00 ± 297.91 and 9726.67 ± 161.84, respectively. In case of breeding units, total return in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs was Rs. 37525.00 ± 744.29, 33553.33 ± 687.50 and 30922.22 ± 494.53, respectively, with an overall mean of Rs. 33560.00 ± 532.34. The means for total return in intensive, semi-intensive and tethering systems of rearing were found to be Rs 35533.33 ± 945.20, 33900.00 ± 804.16, and 31246.67 ± 680.61, respectively. Moanaro *et al*. (2011) under a non-conventional feeding regime reported a substantially lower return of Rs 9471.00 in Large Black X pig. Perusal of the results of analysis of variance presented in Tables 3 and 4 revealed that the genetic group and system of rearing had a highly significant effect on total return in both fatteners and breeding units. The interaction effect was found to be significant in fatteners only. The pig farmers earned significantly higher income in HD-K75 pigs under the intensive system and earned lower income in Ghoongroo pigs under the tethering system.

Net Return

The net return in HD-K75 was Rs. 2869.67 ± 341.17, in HD-K75 X Ghoongroo was Rs. 2537.27 ± 252.10 and in Ghoongroo was Rs.1751.06 ± 199.13. in fattener pigs. In fattener the net returned averaged over rearing systems were respectively Rs. 2480.83 ± 205.24, 1785.17 ± 296.95 and 987.17 ± 225.17 (Table 1). Genetic group and also the rearing system exerted a highly significant effect (p <0.01) on net return in fatteners. Ghoongroo had a significantly lower net return than the other two genetic groups. On the other hand, all three rearing systems differed significantly from one another. In breeding units, the means for net return in HD-K75, HD-K75

Table 2: Cost and return estimates in breeding units of pig under field condition as per genetic groups and systems of rearing

Items	*Intensive system*		*Semi-intensive system*		*Tethering system*		*Overall*	
	Mean ± SE (N)	*CV%*	*Mean ± SE (N)*	*CV%*	*Mean ± SE (N)*	*CV%*	*Mean ± SE (N)*	*CV%*
A. VARIABLE COST								
HD-K75	28152.00 ± 686.99 (4)	4.88	27164.00 ± 628.97 (4)	4.63	26000.00 ± 649.36 (4)	5.00	27105.33^{A} ± 433.05 (12)	5.53
HD-K75 X GHOONGROO	27480.00 ± 682.93 (5)	5.56	26260.00 ± 502.61 (5)	4.28	24880.00 ± 818.17 (5)	7.35	26206.67^{A} ± 461.32 (15)	6.82
GHOONGROO	24900.00 ± 570.39 (6)	5.61	24466.67 ± 384.43 (6)	3.85	23216.67 ± 360.94 (6)	3.81	24194.45^{B} ± 298.53 (18)	5.23
TOTAL	26627.20^{A} ± 514.49 (15)	7.48	25783.73^{B} ± 398.79 (15)	5.99	24513.33^{B} ± 446.99 (15)	7.06	25641.42 ± 288.60 (45)	7.55
B. GROSS COST								
HD-K75	29302.00 ± 687.01 (4)	4.69	27914.00 ± 628.97 (4)	4.51	26450.00 ± 649.36 (4)	4.91	27888.67^{A} ± 490.38 (12)	6.09
HD-K75 X GHOONGROO	28630.00 ± 682.94 (5)	5.33	27010.00 ± 502.61 (5)	4.16	25330.00 ± 818.17 (5)	7.22	26990.00^{B} ± 511.75 (15)	7.34
GHOONGROO	26050.00 ± 570.38 (6)	5.36	25216.67 ± 384.43 (6)	3.73	23666.67 ± 360.95 (6)	3.74	24977.78^{C} ± 341.36 (18)	5.80
TOTAL	27777.20^{A} ± 514.50 (15)	7.17	26533.73^{B} ± 398.79 (15)	5.82	24963.33^{C} ± 447.00 (15)	6.94	26424.76 ± 310.26 (45)	7.88
C. TOTAL RETURN								
HD-K75	40175.00 ± 566.25 (4)	2.82	37800.00 ± 470.80 (4)	2.49	34600.00 ± 577.33 (4)	3.34	37525.00^{A} ± 744.29 (12)	6.87
HD-K75 X GHOONGROO	35720.00 ± 767.08 (5)	4.80	34160.00 ± 592.13 (5)	3.88	30780.00 ± 914.00 (5)	6.64	33553.33^{B} ± 687.50 (15)	7.94
GHOONGROO	32283.33 ± 861.56 (6)	6.54	31083.33 ± 760.45 (6)	5.99	29400.00 ± 578.50 (6)	4.82	30922.22^{C} ± 494.53 (18)	6.79
TOTAL	35533.33^{A} ± 945.20 (15)	10.30	33900.00^{B} ± 804.16 (15)	9.19	31246.67^{C} ± 680.61 (15)	8.44	33560.00 ± 532.34 (45)	10.64
D.NET RETURN								
HD-K75	10873.00 ± 636.55 (4)	11.71	9886.00 ± 498.40 (4)	10.08	8150.00 ± 348.81 (4)	8.56	9636.33^{A} ± 430.88 (12)	15.49
HD-K75 X GHOONGROO	7090.00 ± 731.85 (5)	23.08	7150.00 ± 331.66 (5)	10.37	5450.00 ± 1004.49 (5)	41.21	6563.33^{B} ± 449.32 (15)	26.51
GHOONGROO	6233.33 ± 718.99 (6)	28.25	5866.66 ± 653.92 (6)	27.30	5733.33 ± 476.39 (6)	20.35	5944.44^{B} ± 342.76 (18)	24.46
TOTAL	7756.13^{A} ± 640.22 (15)	31.97	7366.27^{AB} ± 521.59 (15)	27.42	6283.33^{B} ± 476.46 (15)	29.37	7135.25 ± 324.39 (45)	30.50
E. NET RETURN PER PIGLET								
HD-K75	1034.28 ± 229.16 (4)	44.31	843.60 ± 188.92 (4)	58.52	766.60 ± 38,92 (4)	33.02	881.13 ± 103.15 (12)	45.80
HD-K75 X GHOONGROO	741.625 ± 203.00 (5)	61.21	660.10 ± 174.44 (5)	53.87	646.00 ± 42.07 (5)	46.59	717.45 ± 134.27 (15)	72.48
GHOONGROO	660.10 ± 76.39 (6)	46.29	617.75 ± 80.01 (6)	64.77	543.08 ± 24.64 (6)	27.22	661.19 ± 74.62 (18)	46.53
TOTAL	784.30 ± 115.01 (15)	56.79	704.84 ± 77.25 (15)	42.45	645.84 ± 87.48 (15)	52.46	711.66 ± 59.45 (45)	56.04
F. B: C RATIO								
HD-K75	1.37 ± 0.03 (4)	4.34	1.36 ± 0.02 (4)	3.49	1.31 ± 0.02 (4)	2.95	1.34^{A} ± 0.02 (12)	3.90
HD-K75 X GHOONGROO	1.25 ± 0.03 (5)	4.83	1.26 ± 0.01 (5)	2.28	1.22 ± 0.04 (5)	8.14	1.24^{B} ± 0.02 (15)	5.36
GHOONGROO	1.24 ± 0.03 (6)	5.56	1.23 ± 0.03 (6)	4.96	1.24 ± 0.02 (6)	3.99	1.24^{B} ± 0.01 (18)	4.60
TOTAL	1.28 ± 0.02 (15)	6.46	1.28 ± 0.02 (15)	5.35	1.25 ± 0.02 (15)	5.81	1.27 ± 0.01 (45)	5.83

N.B. Values within parentheses are number of observations. Sub-class means with at least one superscript in common do not differ significantly ($P<0.05$). Differences between genetic groups combined over rearing systems and differences between rearing systems combined over genetic groups are indicated by uppercase letters

Table 3: Results of analysis of variance showing the effects of genetic group, rearing systems and their interaction on different cost and return components in fatteners.

Effects	*d.f.*	*Variable cost*	*Fixed cost*	*Gross cost*	*Total Return*	*Net return*	*Net return per Kg live weight*	*B:C ratio*
		MSS	*MSS*	*MSS*	*MSS*	*MSS*	*MSS*	*MSS*
Genetic group(G)	2	1386496.00**	2396.00*	1503488.00**	11822850.00**	5078465.00**	433.89	0.0409**
System of rearing (R)	2	8015745.00**	1321446.00**	15387900.00**	57990400.00**	13799270.00**	1470.76**	0.0883**
G xR	4	446912.00**	863.00	442048.00**	1470464.00**	316616.00	76.67	0.0009
Error	36	108977.80	710.66	111893.30	377756.40	332768.00	157.11	0.0040

*= P<0.05 **= P<0.01

Table 4: Results of analysis of variance showing the effects of genetic group, rearing systems and their interaction on different cost and return components in breeding units

Effect	*df*	*Variable cost*	*Gross cost*	*Total Return*	*Net return*	*Net return per piglet*	*B:C ratio*
		MS	*MS*	*MS*	*MS*	*MS*	*MS*
Genetic group(G)	2	34098180.00**	34098180.00**	156950500.00**	52747900.00**	47534.25	0.0465**
System of rearing(S)	2	16984070.00**	29825030.00**	70211600.00**	8734720.00*	76194.17	0.0030
G x S	4	351744.00	351232.00	2783232.00	1960960.00	184342.7	0.0020
Error	36	1703993.00	1703993.00	2657052.00	2153891.00	123904.5	0.0037

*= P<0.05 **= P<0.01

x Ghoongroo and Ghoongroo were respectively Rs. 9636.33 ± 430.88, 6563.33 ± 449.32 and 5944.44 ± 342.76 and the respective means for the three rearing systems were 7756.13 ± 640.22, 7366.27 ± 521.59 and 6283.33 ± 476.46 (Table 3). The genetic group effect was highly significant (p <0.01) and the rearing system effect was significant (p <0.05). HD-K75 surpassed the other two genetic groups, and the intensive system was found to have the highest net return. Interaction effects were not found to be significant in either of the two effects studied.

Net return per kg live weight/ per piglet

The net return per kg of live weight in fatteners of HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs under field condition was Rs. 42.75 ± 4.33, 39.59 ± 3.91 and 32.38 ± 3.24, respectively with overall mean of Rs. 37.55 ± 2.22, and the net return/Kg live weight in intensive, semi-intensive and tethering system was found to be Rs 47.04 ± 3.04, 38.40 ± 3.29 and 27.28 ± 3.33, respectively. In breeding units, the net return per piglet in HD-K75, HD-K75 xGhoongroo and Ghoongroo pigs under field conditions was Rs. 881.13 ± 103.15, 717.45 ± 134.27 and 661.19 ± 74.62, respectively, with an overall mean of Rs. 711.66 ± 59.45. In breeding units, in the intensive, semi-intensive and tethering system net return per piglet was estimated as Rs 784.30 ± 115.01, 704.84 ± 77.25 and 645.84 ± 87.48, respectively. The results of analysis of variance showed that the system of rearing had a highly significant effect on net return per kg live weight in fattener pigs, however, there were no significant effect of genetic group on fatteners and breeding unit. The effect of the system of rearing was also not found to be significant on net return per piglet in breeding units. The interaction effects in fatteners and the breeding units were not significant. The tethering system was not found suitable in terms of net return per Kg live weight in fatteners.

Cost benefit ratio (B:C ratio)

The average cost benefit ratio in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs under field condition were 1.28 ± 0.03, 1.26 ± 0.02 and 1.18 ± 0.02, respectively; the overall mean being 1.24 ± 0.01. The B:C ratio in intensive, semi-intensive and tethering systems of rearing was found to be 1.31 ± 0.02, 1.25 ± 0.02 and 1.15 ± 0.02, respectively. The present results were found well in agreement with the findings of Selvakumar *et al*. (1993), who calculated that B:C ratio as 1.17 for small units and 1.38 for large units. In the breeding unit, the cost-benefit ratio in HD-K75, HD-K75 X Ghoongroo and Ghoongroo pigs was 1.34 ± 0.02, 1.24 ± 0.01 and 1.24 ± 0.02, respectively, with an overall mean of 1.27 ± 0.01. The averages for B:C ratio in breeding units under intensive, semi-intensive and tethering systems of rearing were found to be respectively 1.28 ± 0.02, 1.28 ± 0.02 and 1.25 ± 0.02. The results of analysis of variance showed that the genetic group and system of rearing had a highly significant effect (P<0.01) on the cost-benefit ratio (B:C ratio) in the fattener unit. Ghoongroo was found significantly

inferior to the other two genetic groups in respect to the B:C ratio. In fatteners, all three rearing systems differed significantly from one another. In breeding units, only the genetic group exerted a significant effect (p <0.01), not the rearing systems. HD-K75 was found superior to other two genetic groups (p <0.05) in B:C ratio in the breeding units. In both fatteners and breeding units interaction effect was not significant(p >0.05). Working with pigs fed on different feeding regimens involving mostly non-conventional feed ingredients in varying proportions, Kumar *et al*. (2004) reported a range of B:C ratios that were relatively higher than the present values in Tamworth X Desi (T and D), Hampshire X Tamworth X Desi and Desi pigs of Jharkhand.

Conclusion

The findings of the present investigation throw light on the economic efficacies of the three genetic groups of pigs as reared under three commonly adopted rearing systems under field conditions in the study area. Most of the parameters that influence the economy indicate HD-K75 as the best option and those intensive and semi-intensive systems are more profitable than the tethering system, and so the latter system is discouraged. In particular, the findings regarding the B:C ratio for fatteners and breeding units indicate pig enterprise as a profitable and economically viable enterprise in Assam, even under field conditions. The information generated through the present investigation will help the farmers and the breeders alike in strategizing effectively to maximize profit.

References

Kumar R., PrasadC. M., Singh, S. K. and Prasad, S. 2004. Economics of pig farming in Jharkhand. The Indian Journal of Animal Sciences., **74** (4):45-45.

Moanaro Ngullie E., Walling I., Krose M. and Bhatt B. P. 2011. , Traditional animal husbandry practices in tribal states of Eastern Himalayan , India: A case study. Indian J. Anim. Nutr., **28** (1): 23-28.

Selvakumar K. N., Prabhaharan R .and Sundaresan R. 1993. Economics of Large White Yorkshire swine production in Coimbatore district of Tamil Nadu state. Indian Vet. J., **70**: 942-944.

Senthilkumar S. and Raja M B. 2021. Empowerment of rural youth through pig farming: A case study. The Pharma Innovation Journal., **10** (6): 595-598.

Snedecor G. W. and Cochran W.G.1989. Statistical methods. Eighth Edition. Iowa State Univ. Press, Ames, USA.