

## **Economics of vermi-composting of cattle dung, sheep manure and poultry litter under temperate agro-climatic conditions of Kashmir valley**

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### **Abstract**

The present study was carried out in the Division of Livestock Production and Management, Faculty of Veterinary Sciences and Animal Husbandry (SKUAST - Kashmir) to estimate the economics of vermi-compost prepared from cattle dung, sheep manure and poultry litter under the agro climatic conditions of Kashmir Valley. Four groups formulated for carrying out vermi-composting was: Group G1: Cattle dung (Control), Group G2: Cattle dung + Sheep manure, Group G3: Cattle dung + Poultry manure, Group G4: Cattle dung + Sheep manure + Poultry litter. Each group consisted of four replicates (sub groups). The duration of the trail was 5 months. The fixed cost of Rs. 1600.0 and variable cost of Rs. 350.0 was observed in all groups. The total cost involved was Rs. 1950 in all groups. The net profit of vermi-composting was highest in G1 (Rs. 118.5), lowest in G4 (Rs. 43.5) whereas negative net profit was observed in case of G3 (Rs. 24.5). The profit per kg of end product was highest and lowest in G1 (Rs 3.80) and in G4 (Rs 1.70) respectively.

**Keywords:** Economics, vermin-composting, cattle dung, sheep manure and poultry litter

### **1. Introduction**

Livestock sector plays a key role in the development of the Indian economy as it contributes around 4.11% to national GDP and 25.6% to the total agricultural GDP [1]. In Jammu and Kashmir the livestock sector contributes around 11% to GDP. India has the largest livestock population (536.76 million) in the world with 193.46 million cattle, 74.26 million sheep and about 851.80 million poultry population [2]. In India the annual cattle dung production recorded was 562 million tons [3]. About 60-80 lakh poultry birds are reared annually for slaughtering and generate about 1.8 lakh tons of litter manure in Kashmir valley [4]. India has reported around 370 million tons of sheep manure of which 17 million tons were annually generated in Jammu and Kashmir [5]. Cattle dung, sheep manure and poultry litter provides valuable macro and micro nutrients and are utilized in the agricultural fields as organic fertilizer. Due to more intensive farming, waste in the form of cattle dung, sheep manure and poultry litter when accumulated in large quantities is a source of nuisance as it becomes a breeding ground for flies, rodents, smelling foul and also releasing various greenhouse gases like methane in the environment [6]. So, it becomes very crucial to opt a very eco-friendly method like vermi-composting for the disposal and proper utilization of animal waste. Vermicomposting involves bio-oxidation and stabilization of organic material with the

common involvement of both earthworms and micro - organisms [7, 8, 9]. Vermicompost as a bio-fertilizer has the potential to reduce the use of chemical fertilizers and thus eliminate the negative impact on soil health which may result in soil erosion, soil pollution, soil salinization, etc. Although there are a number of earthworm species found in Kashmir, *Eisenia fetida* has been found to be the most suitable one [10]. In Kashmir valley utilization of cattle dung by vermi-composting has been carried out by many workers but no data regarding vermi-composting of sheep manure and poultry litter is available yet.

### **Materials and Methods**

The present study was carried out in a vermi-composting shed at Dairy Unit of the Division of Livestock Production and Management, Faculty of Veterinary Sciences and Animal Husbandry, Shuhama, Ganderbal (Jammu and Kashmir) to analyze the economics while vermi-composting farm waste. Waste material in the form of cattle dung, sheep manure and poultry litter was utilized for conducting the vermi-composting study.

Vermicomposting was done in plastic bins with a capacity of 30 liters. The cattle dung, sheep manure and poultry litter were procured from the dairy unit of Division of Livestock Production and Management, MRCGS (SKUAST-Kashmir) and Poultry farm of Division of Livestock Production and

Management respectively. The red earthworms (*Eisenia fetida*) were procured from MLRI (Mountain Livestock Research Institute) Manasbal (SKUAST-Kashmir). The vermi-composting was carried out in plastic bins each having the capacity of 30 liters. There were four groups and each group contained four replicates as shown in Table 1. The cost of production of vermi-compost calculated with the following assumptions.

- The cost of each plastic bin was Rs. 400.00.
- The cost of earthworms was 300/group.
- The cost for loading, remixing, unloading and transportation of animal and poultry waste per bin was worked out as Rs. 12.50 per bin per composting.
- Dung, Sheep manure and Poultry litter were received free of cost.
- Value of the end product was Rs. 15/kg of vermi-compost.

### The economics was worked out as follows

#### 1. Fixed cost

- Cost of plastic bins.

#### 2. Variable cost

- Cost of earthworms
- Cost of loading, remixing, unloading and transportation of animal and poultry wastes and labor etc.

#### 3. Total cost involved: I + II

### 4. Gross profit

- The gross revenue was calculated by selling the vermicompost @ Rs. 15/kg

**Net profit:** IV-III.

**Table 1:** Experimental plan

Groups	Cattle Dung (%)	Sheep Manure (%)	Poultry Litter (%)
G1	100	-	-
G2	50	50	-
G3	50	-	50
G4	33.33	33.33	33.33

### Statistical Analysis

The statistical analysis of the data collected was done as per Snedecor and Cochran (1994) <sup>[11]</sup> using one way ANOVA with SPSS software for comparing the different means.

### Results

The economics of vermi-composting is presented in Table 2. The fixed cost of Rs. 1600.0 and variable cost of Rs. 350.0 was observed in all groups. The total cost involved was Rs. 1950 in all groups. The net profit of vermi-composting was highest in G1 (Rs. 118.5), lowest in G4 (Rs. 43.5) whereas negative net profit was observed in case of G3 (Rs. 24.5). The profit per kg of end product was highest and lowest in G1 (Rs 3.80) and in G4 (Rs 1.70) respectively.

**Table 2:** Economics of Vermi-composting

Groups	Fixed cost (Rs.)	Variable cost (Rs.)	Total Cost (Rs.)	Vermi-compost obtained (kg)	Cost involved/kg Vermi-compost (Rs.)	Gross profit (Rs.)	Net profit (Rs.)	Profit/kg of vermi-compost (Rs.)
G1 (Control cattle dung)	1600.0	350.0	1950.0	31.2	11.2	468.5	118.5	3.8
G2 (Cattle Dung + Sheep manure)	1600.0	350.0	1950.0	27.0	13.0	404.9	54.9	2.0
G3 (Cattle Dung + Poultry litter)	1600.0	350.0	1950.0	21.7	16.2	325.5	-24.5	-1.2
G4 (Cattle dung + sheep manure + Poultry litter)	1600.0	350.0	1950.0	26.2	13.3	393.5	43.5	1.70

### Discussion

The fixed cost and variable cost of vermi-composting was Rs. 1600.0 and Rs variable 350.0 respectively in all groups. The net profit per kg of vermi-compost was highest and lowest respectively in G1 (Rs 3.80) and in G4 (Rs 1.70) respectively. Appreciable net profits were obtained except for G3 (containing cattle dung and poultry litter). Comparably (Kumar *et al.*, 2021) <sup>[12]</sup> observed total cost of production per quintal of vermi-compost as Rs. 2458.92 (Rs. 24.58/kg). As per Patel *et al.* (2021) <sup>[13]</sup> per cubic meter net income was higher in constructed method i.e., Rs. 14157.69 (Rs. 141.57/kg) than vermin bed method i.e., Rs 2201.68 (Rs 22.01/kg). It was concluded that with the continuity of more vermi-composting trails the margin of profit could be further enhanced <sup>[14]</sup>.

### Conclusion

From the economic point of view it could be concluded that that inclusion level of poultry litter beyond 50% was not feasible in terms of net returns.

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