# Growth Performance of Milk Production in Jharkhand: An Economic Analysis

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## ABSTRACT

The study is based on secondary data collected from various sources i.e. from Department of Agriculture, Animal Husbandry, Government of Jharkhand, National Dairy Development Corporation and Data books. The cross breed population has significantly increased in the state from 62 thousand to 125 thousand during 2003 to 2012-13. This change would certainly increase quantity of milk production. The growth rate of milk production was about 4.7 per cent per year as compound rate in the state and further expected to quantum change in total milk production was about 4.7 per cent per annum. The projection of milk production by 2025-26 is also estimated for the state on the basis of milk production over period and state would be able to produce nearly 2418 thousand tones by the end of 2025-26 in the state.

**Keywords:** Growth rate, milk production, bovine and cross breed cow

Jharkhand state came into existence on 15th November, 2000 after division of Bihar. The agricultural cultivated land near about 27 lack hectare which is near about 87 per cent of total geographical area. Of the total cultivated land near about 57 per cent area is rainfed area and poorly 13 per cent area is irrigated area in the state. The cropping intensity is about 115 per cent. The average size of operational holding is about 1.20 hectare which is more than national average level of operational holding. Due to rainfed agriculture only rainy season crops are growing and rainy season crops are grown only near about 15-16 per area when irrigation facility is available. The labor migration is a culture in the state from December to June every year. In this situation livestock enterprise is only solution to provide regular employment and income to rural people. There is abundant waste land, uncultivable land, fellow land and forest land create an opportunity for keeping dairy animal small rumen rent and pig farming in the state. In recent year many schemes have been initiated by the state government and central government to improve the economic structure of the rural as well as urban population. An attempt has been made to get information about growth rate of milk production.

## MATERIALS AND METHODS

The study was under taken in Jharkhand state to meet the main objectives pertaining to production of milk. The study was based on secondary data on milk production which was collected from Department of Agriculture and Animal Husbandry, Jharkhand. To

examine the trend of milk production in Jharkhand simple linear regression equation of the following form was fitted.

$Y = ab^t$, where $b = 1 + r$

Or $Log\ Y = Log\ a + t\ log\ b$

Or $\log b = \dfrac{(\log y - \log a)}{t}$

Substituting $(1 + r)$ for '$b$', we get,

$\log(1+r) = \dfrac{(\log y - \log a)}{t}$

Say $\dfrac{(\log y - \log a)}{t} = Quantity\ of\ 'X'$

Therefore $(1 + r) = $ Antilog $X$ –1

Compound annual growth rate = (Antilog $b$ – 1)

### Trend value

The straight line equation was carried out by using linear mathematical equation of the first degree of probability i.e. $Y = a + bx$. Since time series data of milk production contain odd numerical years. Thus, $X$ was taken from the med year, $Ex = 0$ (2009). In order to determinant constant '$a$' and '$b$'.

$a = \dfrac{\sum Y}{n}, b = \dfrac{\sum XY}{\sum X^2}$

Where,

  $Y$ = the value in the time series (dependent variable)

  $X$ = the unit of time (independent variable)

  $n$ = the number of times

Other statistical tools such as percentage, compound growth rate, index etc were also used to interpret the analysis data. The results are interpreted with the help of simple tabular form.

### RESULTS AND DISCUSSION

### Composition of Milk Animal

The analysis of data is discussed under different heads under composition of milch animal: In this study milch animals include cross bred cow, local cow and milch buffalo. The study revealed that milch crossbred cow, local cow and milch buffaloes

consist of 2.40 per cent, 76.70 per cent and 20.90 per cent, respectively in 2003-04 to the state (Table 1). It indicates that local cow is predominant in milch animal.

There was no mark change in the period of 2007-08 in the state. The share of local cows rather increased during 2007-08 and went up to near about 82 per cent, while share of buffaloes decreased (15.68 per cent) during the same period. The performances of dairy farmers have been changed in the state and it was marked a significant changes in rearing of cross-bred cow in the state. The proportion of crossbred cow increased from 2.56 per cent to 4.94 per cent during the period from 2007-08 to 2012-13. In this period milch buffaloes decreased from 15.66 per cent to 13.80 per cent, respectively. The local cattle remained the same in this period.

The share of state in total milch animal of the country was 0.50 per cent, 4.50 per cent and 3.50 per cent, respectively of crossbred, local cow and milch buffaloes in 2007-08 (Table 2). The share of cross bred cow has increased during 2012-13 and climbed to 0.64 per cent from 0.47 per cent in 2007, while share of local cow and buffaloes decreased in the same period.

### Trend in milk production

Trend is that component of variation which revealed general direction of change over a period of time. The estimation of trend is essential to study the general behavior of time series data and to work out period indices. The trend in the milk production in Jharkhand was obtained by using time series data from 2001-02 to 2017-18 and result is presented in the Table 3. It is appeared from the table 2 that it approved a continuous increasing trend in the milk production except 2009-10. The index of milk production taking as 2001-02 as base year was 940.0 thousand tons, in 2008-09 as 1466 thousand tons about 1680.0 in 2012-12 and 1812.0 thousand tons in 2015-16 and further as high as 2016.0 in 2017-18 respectively over the base year. The overall compound growth rate was 4.70 per cent in the state.

### Estimation of milk production

On the basis of the data on milk production in Jharkhand an effort has been made to estimate the trend value of milk production for the corresponding

**Table 1:** Composition of milch bovine population in Jharkhand (Figure in '000)

| Category | 2003-04 | 2007-08 | Changing over 2003-04 | 2012-13 | Changing over 2007-08 |
|---|---|---|---|---|---|
| Crossbred cow | 62.00 (2.40) | 67.26 (2.56) | 8.5 % | 125.0 (4.94) | 86 % |
| Local cow | 1982.0 (76.70) | 2146.66 (81.75) | 8.3 % | 2065.7 (81.55) | -4.0 % |
| Total milch cattle | 2044.0 (79.10) | 2213.92 (84.32) | 8.3 % | 2190.7 (86.20) | -1.04 % |
| Milch buffaloes | 540.00 (20.90) | 411.85 (15.68) | -23.81 | 341.4 (13.30) | -17.0 % |
| Total Milch bovine | 2554.0 (100.0) | 2625.77 (100.0) | 1.62 | 2523.13 (100.0) | -0.40 |

*Figure in parenthesis indicate percentage.*
***Source:*** *Economic survey, 2016-17, GoI, New Delhi and Agricultural Resource use of Jharkhand, Department of Agriculture.*

**Table 2:** Share of Jharkhand milch bovine to the India's milch bovine (Figure in '000)

| Category | 2007-08 | | Share | 2012-13 | | Share (%) |
|---|---|---|---|---|---|---|
| | India | Jharkhand | | India | Jharkhand | |
| Crossbred cow | 1440.7 | 67.26 | 0.47 | 19420.0 | 125.0 | 0.64 |
| Local cow | 48047 | 2146.66 | 4.47 | 48124.0 | 2065.7 | 4.30 |
| Total milch cattle | 62447 | 2213.92 | 3.50 | 67544.0 | 2190.7 | 3.24 |
| Milch buffaloes | 48647 | 411.85 | 0.84 | 51054.0 | 341.4 | 0.5 |
| Total Milch bovine | 111088 | 2625.77 | 2.36 | 118598.0 | 2532.0 | 2.13 |

**Source:** Economic survey, 2016-17, GoI, New Delhi and Agricultural Resource use of Jharkhand, Department of Agriculture.

**Table 3:** Milk production in Jharkhand (2001-02 to 2017-18) ('000 metric tons)

| Year | Production | Index | Percentage change over base year |
|---|---|---|---|
| 2001-02 | 940.0 | 100.0 | — |
| 2002-03 | 952.0 | 101.27 | 1.27 |
| 2003-04 | 954.0 | 101.48 | 1.48 |
| 2004-05 | 1330.0 | 141.48 | 41.48 |
| 2005-06 | 1335.0 | 142.02 | 42.02 |
| 2006-07 | 1401.0 | 149.04 | 49.04 |
| 2007-08 | 1442.0 | 153.40 | 53.40 |
| 2008-09 | 1466.0 | 155.95 | 55.95 |
| 2009-10 | 1464.0 | 155.74 | 55.74 |
| 2010-11 | 1555.0 | 165.42 | 65.42 |
| 2011-12 | 1580.98 | 168.08 | 68.08 |
| 2012-13 | 1679.59 | 178.61 | 78.61 |
| 2013-14 | 1699.83 | 180.74 | 80.74 |
| 2014-15 | 1733.73 | 184.43 | 84.43 |
| 2015-16 | 1812.38 | 192.80 | 92.80 |
| 2016-17 | 1893.80 | 201.46 | 101.46 |
| 2017-18 | 2015.65 | 214.43 | 114.43 |
| CGR = 4.72 per cent | | | |

**Source:** National Dairy Development Board and Directorate of Agriculture, Government of Jharkhand.

years. For the purpose linear regression analysis being the best fit was applied and result worked out in the following equation:

$$\hat{Y} = a + bx$$

The results based on the equation, presented in table 4. The projections of milk production for 2020-21 and 2025-26 has also been made on the basis of trend values. The analysis revealed that the actual milk production was much higher than estimated milk

**Table 4:** Trend equation (a+bx) for milk production ('000 tons)

| Year | Actual production | Estimated value of Y = 1480 + 62.65 X | | | | |
|------|-------------------|------|---|---------|---|----------|
| 2001-02 | 940.0 | 1480 | + | -500.4 | = | 979.60 |
| 2002-03 | 952.0 | 1480 | + | -437.84 | = | 1042.16 |
| 2003-04 | 954.0 | 1480 | + | -375.3 | = | 1164.70 |
| 2004-05 | 1330.0 | 1480 | + | -312.75 | = | 1167.25 |
| 2005-06 | 1335.0 | 1480 | + | -250.2 | = | 1220.80 |
| 2006-07 | 1401.0 | 1480 | + | -187.65 | = | 1292.35 |
| 2007-08 | 1442.0 | 1480 | + | -125.1 | = | 1355.90 |
| 2008-09 | 1466.0 | 1480 | + | -62.55 | = | 1417.45 |
| 2009-10 | 1464.0 | 1480 | + | 0 | = | 1480.00 |
| 2010-11 | 1555.0 | 1480 | + | 62.55 | = | 1542.55 |
| 2011-12 | 1580.98 | 1480 | + | 125.1 | = | 1605.10 |
| 2012-13 | 1679.59 | 1480 | + | 187.65 | = | 1667.65 |
| 2013-14 | 1699.83 | 1480 | + | 250.2 | = | 1730.20 |
| 2014-15 | 1733.73 | 1480 | + | 312.75 | = | 1792.75 |
| 2015-16 | 1812.38 | 1480 | + | 375.3 | = | 1855.30 |
| 2016-17 | 1893.80 | 1480 | + | 437.84 | = | 1917.84 |
| 2017-18 | 2015.65 | 1480 | + | 500.4 | = | 1980.40 |
| 2020-21 | — | 1480 | + | 688.05 | = | 21688.00 |
| 2025-26 | — | 1480 | + | 938.25 | = | 2418.25 |

production in 2004-05, 2005-06, 2006-07, 2007-08, and 2008-09 and much lesser during 2001-02, 2002-03, 2003-04, 20014-15, and during 2015-16. But for the remaining period the actual production was found to be almost the same level as that of the estimated milk production. The milk production is expected to increase 2168.05 thousand tons in 2020-21 and 2418.25 thousand tons in 2025-26 in the state.

## CONCLUSION

The study reveals that the share of cross bred cow in milch animal population has increased in Jharkhand and the dairy farmers are taking interest in adoption of improved bred cow in the state. The increase in number of improved dairy animals has helped in increasing milk production. It is projected that milk production would raise about 2418 tons in 2025-26 as compared to just 940 thousand tons in 2001-02. The incremental changes in milk production can definitely improve nutritional as well as income and employment of the dairy farmers and people of the state.

## REFERENCES

Anonymous, Milk production in Jharkhand (2001-02 to 2017-18). Department of Agriculture and Animal Husbandry, Government of Jharkhand, Ranchi.

Prakash, J. and Singh, R.P. 2019. Growth performance of milk and fish production in Bihar. *Journal of Pharmacology and Phyto-Chemistry*, **8**(3): 3071-3073.

Singh, B. and Chahal, S.S. 1997. Growth performance of poultry and egg production in Punjab, *Bihar Journal of Agricultural Marketing*, **5**(4): 474-478.

Mishra, R.K. and Choudhary, J.S. 2012. Agricultural research data base of Jharkhand, Department of Agriculture and Cane Development, Government of Jharkhand.