



## **RELATIONSHIP BETWEEN GROWTH OF DAIRY INDUSTRY AND GROWTH OF MAIN CROPS IN INDIA**

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### **ABSTRACT**

*It is the theory of economics that the growth of one industry is helpful in growth of its complementary industry. Question is that is it also true for rural economy of India? Present manuscript is an attempt to check the relationship between the growth in production of main crops and growth of milk production in India.*

### **Key Words**

Dairy Industry, Agriculture Growth, production of wheat, production of rice

### **Introduction**

Animals have been playing a great role in growth and development of human civilization. Animals help in agriculture, transportation, provides meat, milk, leather, bones etc. Various animals prove a good friend of the human. Without the role of animals human growth may not reached where it is in present. In Indian civilization cow is treated as scared animals. It is not treated as just an animal but it is treated as equivalent to the mother of human in Hindus. It is serving with its milk the countless generations of the human. The milk of cow also treated as holy thing in India. It is the part of standard food in hindus in India. Various things

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like curd, Cheese, lassi, Ghee, Khoya, and various sweets are made of cow milk. Cow milk is also used for worship in various festivals in India. It is the reason why Indian farmers like to Dairy farming. Small farmers who cannot afford the large number of cattle also like to keep at least one cow for production of milk for their domestic use.

The growth of dairy industry is associated with the resources available to the dairy industry of the country. The production growth of the some crops like wheat, rice etc. is directly associated with the growth of the dairy industry in India. Growth of main crops provides purchasing power to farmers and grass, fodder which is helpful in growth of the dairy industry.

### **Objectives of the study**

1. Quantify the average growth of dairy industry in India.
2. Quantify the average growth of production of wheat in India.
3. Quantify the average growth of production of rice in India.
4. Find out the relationship between growth of dairy Industry and growth of rice production in India.
5. Find out the relationship between growth of dairy Industry and growth of wheat production in India.
6. Measure deviation in year wise production of wheat, rice and milk in India

### **Research Methodology**

Research is based on secondary data collected from various sources. Main objective of the research is to find out the relationship between the growth of dairy industry and growth of agriculture in India. Research question is that, is there any co-relation between growth of dairy industry and growth of main crops in India? Production of wheat and production of rice is taken as independent variables and production of milk is taken as dependent variable. Growth of dairy Industry is quantified by the production of milk. Growth of agriculture is shown by the production of main crops i.e. production of wheat and production of rice in

India. Main reason of selection of these crops is that these are the main crops and used for consumption in all over India.

### **Limitations of the study**

Main limitation of the study is that the reliability of the study is depending on the accuracy of the data. Secondary data is used for the study. Production of milk is including the total milk production. It includes the production of milk from all cattle; some of the cattle like goat, camel are not the main part of the dairy industry.

### **Data Presentation and Analysis**

**Table (1)- Production of milk, wheat and rice in India**

<b>Year</b>	<b>Production of Milk Million Tonnes) (Y)</b>	<b>(In Production of Wheat (In 1000 Billion Tonnes) (X1)</b>	<b>Production of Rice (In 1000 Billion Tonnes) (X2)</b>
1996-97	69.1	69.3	82.5
1997-98	72.1	66.3	86.1
1998-99	75.4	71.2	89.7
1999-00	78.3	76.3	85.0
2000-01	80.6	69.6	93.3
2001-02	84.4	72.7	71.8
2002-03	86.2	65.7	88.5
2003-04	88.1	72.2	83.1
2004-05	92.5	68.6	91.8
2005-06	97.1	69.5	93.3
2006-07	102.6	75.8	96.7
2007-08	107.9	78.5	99.2

2008-09	112.2	80.6	89.1
2009-10	116.4	80.8	96.0
2010-11	121.8	86.8	105.3
2011-12	127.9	94.8	105.2
2012-13	132.4	93.5	106.6
2013-14	137.7	95.8	105.5
2014-15	146.3	86.5	104.4
2015-16	155.5	87.0	109.7
2016-17	165.4	98.5	110.0

(Source - <https://www.indexmundi.com/agriculture> and Department of Animal Husbandry, Dairying & Fisheries, Ministry of Agriculture, GoI)

**Table (2)**

**Computation of Spearman' Rank Correlation Coefficient**

**(Between wheat production and milk production)**

X1 (Wheat)	Y(Milk)	R1	R2	D	D <sup>2</sup>
69.3	69.1	17	21	-4	16
66.3	72.1	20	20	0	0
71.2	75.4	15	19	-4	16
76.3	78.3	11	18	-7	49
69.6	80.6	16	17	-1	1
72.7	84.4	13	16	-3	9
65.7	86.2	21	15	6	36
72.2	88.1	14	14	0	0

68.6	92.5	19	13	6	36
69.5	97.1	18	12	6	36
75.8	102.6	12	11	1	1
78.5	107.9	10	10	0	0
80.6	112.2	9	9	0	0
80.8	116.4	8	8	0	0
86.8	121.8	6	7	-1	1
94.8	127.9	3	6	-3	9
93.5	132.4	4	5	-1	1
95.8	137.7	2	4	-2	4
86.5	146.3	7	3	4	16
87.0	155.5	5	2	3	9
98.5	165.4	1	1	0	0
				$\sum D^2 = 340$	

(Source- Calculated by Author)

$$N = 21$$

$$\sum D^2 = 340$$

**Spearman's Rank Correlation Coefficient (Rk)**

$$Rk = 1 - (6 \sum D^2) / (N^3 - N)$$

$$= 1 - (6 * 340) / (21^3 - 21)$$

$$= 1 - 2040 / (9261 - 21)$$

$$= 1 - 2040 / (9240)$$

$$= 1 - 0.22$$

$$= (+) 0.78$$

**Table (3)**

**Computation of Spearman' Rank Correlation Coefficient**

**(Between rice production and milk production)**

<b>X2 (Rice)</b>	<b>Y (Milk)</b>	<b>R1</b>	<b>R2</b>	<b>D (R1-R2)</b>	<b>D<sup>2</sup></b>
82.5	69.1	20	21	-1	1
86.1	72.1	17	20	-3	9
89.7	75.4	14	19	-5	25
85.0	78.3	18	18	0	0
93.4	80.6	11	17	-6	36
71.8	84.4	21	16	5	25
88.5	86.2	16	15	1	1
83.1	88.1	19	14	5	25
91.8	92.5	13	13	0	0
93.3	97.1	12	12	0	0
96.7	102.6	9	11	-2	4
99.2	107.9	8	10	-2	4
89.1	112.2	15	9	6	36
96.0	116.4	10	8	2	4
105.3	121.8	5	7	-2	4

<b>105.2</b>	<b>127.9</b>	<b>6</b>	<b>6</b>	<b>0</b>	<b>0</b>
<b>106.6</b>	<b>132.4</b>	<b>3</b>	<b>5</b>	<b>-2</b>	<b>4</b>
<b>105.5</b>	<b>137.7</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>
<b>104.4</b>	<b>146.3</b>	<b>7</b>	<b>3</b>	<b>4</b>	<b>16</b>
<b>109.7</b>	<b>155.5</b>	<b>2</b>	<b>2</b>	<b>0</b>	<b>0</b>
<b>110.0</b>	<b>165.4</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>
				<b><math>\sum D^2 = 194</math></b>	

(Source- Calculated by Author)

$$N = 21$$

$$\sum D^2 = 194$$

**Spearman' Rank Correlation Coefficient (Rk)**

$$Rk = 1 - (6 \sum D^2) / (N^3 - N)$$

$$= 1 - (6 * 194) / (21^3 - 21)$$

$$= 1 - 1164 / (9261 - 21)$$

$$= 1 - 1164 / (9240)$$

$$= 1 - 0.1259$$

$$= (+) 0.874$$

## Summary of Data Analysis

<b>Pearson correlation coefficient (Wheat and Milk)</b>	<b>0.89</b>
<b>Pearson correlation coefficient (Rice and Milk)</b>	<b>0.87</b>
<b>Spearman' Rank Correlation Coefficient (Wheat and Milk)</b>	<b>0.78</b>
<b>Spearman' Rank Correlation Coefficient (Rice and Milk)</b>	<b>0.87</b>
<b>Standard Deviation (Wheat production)</b>	<b>10.22</b>
<b>Standard Deviation (Rice production)</b>	<b>10.10</b>
<b>Standard Deviation (Milk production)</b>	<b>28.00</b>
<b>Coefficient of variation (Wheat production)</b>	<b>12.93 %</b>
<b>Coefficient of variation (Rice production)</b>	<b>10.64 %</b>
<b>Coefficient of variation (Milk production)</b>	<b>26.14 %</b>

## Interpretation

1. Average annual production of milk between years 1996 to year 2017 is 107.1 million tonnes.
2. Average annual production of wheat between years 1996 to year 2017 is 79.1 billion tonnes.
3. Average annual production of Rice between years 1996 to year 2017 is 94.9 billion tonnes
4. There is direct relationship between growth of wheat production and milk production in India, as there is high correlation between wheat production and milk production.
5. There is direct relationship between growth of rice production and milk production in India, as there is high correlation between rice production and milk production.



6. The growth of Milk production is more dispersed as standard deviation and coefficient of variation is higher than wheat and rice.

### **Conclusion**

On the basis of analysis of data it is concluded that the growth of dairy industry is directly associated with the growth of crop production in India. Its main reason is that the growth of crops production also increases the purchasing power of the population, which is helpful in creating the demand of milk in India. Other aspect is that the growth in production of wheat and rice provide inputs like fodder and other useful inputs for dairy industry. Growth of wheat and rice also increases the capital formation in country, which is also helpful in increasing the capital investment in rural industry in India. It is also helpful in increasing the dairy production in India. Finally it is verifying that the growth of one industry is helpful in growth of its complementary industry, as the growth of crops helpful in growth of dairy industry in India.

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