

रौजनिशीच्या पानांप्रमाणे
दिसांमणिक उलटणाऱ्या
आयुष्याची लढाई लढताना,

माझ्या स्वत्वासाठी

ज्यांनी तत्वांना जपायला शिकवले,

ज्यांनी भाषासांच्या मदीत

माणुसकीच्या वाळवंटात,

माझ्यातील माणुस

जामवला, जमवला, जपला,

जोपासला,

त्या सर्वांना . . .

**MARKETING SYSTEMS OF CATTLE IN GHODEGAON
MARKET OF MAHARASHTRA**

By

MAHESH SAMPATRAO WAMAN

(Reg. No.200158)

A Thesis Submitted to the

MAHATMA PHULE KRISHI VIDYAPEETH, RAHURI – 413 722,

DIST. AHMEDNAGAR, MAHARASHTRA, INDIA

in partial fulfilment of the requirements for the degree

of

MASTER OF SCIENCE (AGRICULTURE)

in

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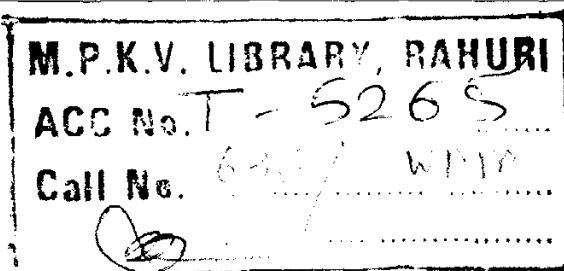
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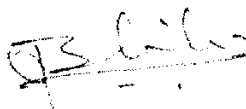
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I, hereby declare that this thesis or part

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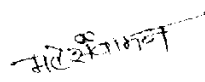
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This is to certify that the thesis entitled, “**MARKETING SYSTEMS OF CATTLE IN GHODEGAON MARKET OF MAHARASHTRA**”, submitted to the Faculty of Agriculture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra, India, in partial fulfilment of the requirement for the degree of **MASTER OF SCIENCE (AGRICULTURE)** in **ANIMAL SCIENCE** embodies the results of a bonafide research work carried out by **Mr. MAHESH SAMPATRAO WAMAN**, under my guidance and supervision and no part of the thesis has been submitted for any other degree or diploma or published in any other form.

The assistance and help received during the course of this investigation and sources of literature referred to have been acknowledged.

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Date : 29/06/2003



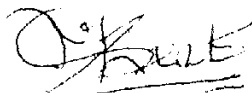
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Maharashtra, India.

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This is to certify that, the thesis entitled, “**MARKETING SYSTEMS OF CATTLE IN GHODEGAON MARKET OF MAHARASHTRA**”, submitted to the Faculty of Agriculture, Mahatma Phule Krishi Vidyapeeth, Rahuri, Dist. Ahmednagar, Maharashtra, India, in partial fulfilment of the requirements for the degree of **MASTER OF SCIENCE (AGRICULTURE)**, embodies the results of a piece of *bona fide* research work carried out by **Mr. Mahesh Sampatrao Waman**, under the guidance and supervision of Dr. B.R. Ulmek, Head, Department of Animal Science and Dairy Science, MPKV, Rahuri and that no part of this dissertation has been submitted for any other degree or diploma.

Place : MPKV, Rahuri
Date : 30 / 04 / 2003


(**D. M. Sawant**)
Associate Dean

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Place : MPKV, Rahuri

Date : 25 /06/2003

Waman M.S.

(Waman M.S.)

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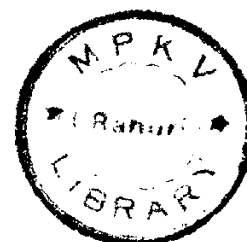
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LIST OF ABBREVIATION

AP	-	Andhra Pradesh
APMC	-	Agricultural Produce Marketing Committee
Govt.	-	Government
HF	-	Holstein Friesian
MPKV	-	Mahatma Phule Krishi Vidyapeeth
MS	-	Maharashtra State
MSL	-	Mean sea level
mm	-	Middlemen
TN	-	Tamil Nadu
WT	-	Wholesale trader

ABSTRACT

**Marketing systems of cattle in Ghodegaon market of
Maharashtra**

By

Shri M.S. Waman

A candidate for degree

Of

Master of Science (Agri.)

Research Guide	-	Dr. B.R. Ulmek Head, Department of Animal Science and Dairy Science MPKV, Rahuri-413 722
Department	-	Animal Science and Dairy Science

The data pertaining trend in marketing systems of cattle were collected from APMC Ghodegaon from October, 1998 to September,2002. To study trend in cattle market, primary data were collected by surveying 550 cattle sellers and buyers. The data were subjected to time series analysis and multiple regression analysis for estimation of marketing trends and effect of different factors on price of animals, respectively.

The arrival of cows and bullocks were highest during rainy and winter seasons, respectively. Whereas, highest prices were recorded during winter and summer season for cows and bullocks, respectively. Disposal of cows were maximum during winter and that of bullocks in summer.

The breed, age and category of cows significantly ($P < 0.05$) influenced price of cow in market. These factors combinely explained 74.14% and 74.60% variations in the price of cows together with young stock and cows without young stock. Coat colour of cows did not show significant effect on price. However, breed, coat colour and age significantly ($P < 0.05$) affected the price of bullocks. These factors explained 77.40% variation in the price of bullocks.

Five different marketing channels were observed. Amongst them farmer - middle man - farmer was preferred in 42% transactions and farmer - trader - farmer was observed in 20% transaction. The involvement of middlemen were almost 72% in the transactions of selling and buying of cattle.

Inadequate infrastructure facility and involvement of middlemen were the major constraints faced by 86 and 82% farmers, respectively in marketing of cattle in Ghodegaon market.

INTRODUCTION



1. INTRODUCTION

In ~~an~~ era of economic reforms and globalization, livestock play very important and vital role in our Indian economy. In short, livestock is the back bone of Indian agriculture. It contributes 4.5 % to national economy. The total milk production of India is 85 Million tonns, the population of cows is 214.87 million. The draught animal power from 83 million animals is equivalent to 30,000 MW in terms of electric power worth of Rs.10000 crores. At present draught animals are being used to plough 100 million ha of land which forms 60% of total cultivated area. In M.S. the crossbred cows contributes 61% to the total milk production of the state. This indicates the importance of cattle. Due to commercialization marketing of produce is gaining prime importance. Appropriate marketing of livestock and its products helps in harvesting maximum profit in any livestock enterprise.

Animal marketing has ancient history. Its roots can be traced in quotation of great Astronomist, Aristotle "Certain condition of environment produces more energetic people and better livestock". In the ancient time, when concept of money was not known in the society, animals were the mode of transaction. Although having such ancient history animal marketing remained neglected, particularly in India. Even after independence, no proper attention was paid on developing or atleast restructuring of cattle markets. Today, the marketing of cattle is co-ordinated by Agril. Produce Marketing Committee in the rural area. Live animals are sold at various levels within village, between villages at live

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stock fairs (2600 fairs in India - Sastri 1995), markets, shows and even exported to other regions and countries. Markets are classified as regulated markets and non regulated markets. Regulated markets are operated by local self Government of elected members called as market committee. Regulated markets are village, tahasil and district level markets. There are 241 livestock markets in Maharashtra.

Though, tahasil and district level markets are having better facilities the major transaction takes place in annual fairs and traditional markets. In Ahmednagar, there are 13 tahasil level markets (APMC) and 1 district market at Ahmednagar. However, Ghodegaon and Loni are most popular markets and the share of these two markets is about 65-70% in total cattle marketing in the district. The people from Ahmednagar, Nasik, Pune, Aurangabad and Beed districts sale / purchase the animals in these markets. The reason for popularity is that they are specialised for cross bred cattle having good production potential and this is leading milk producing tract.

Cattle marketing some times also done in fairs, but these are annual animal markets. In these fairs, different types of competitions are being organized viz. exhibition of breed characteristics, races etc. These are based on ancient philosophy and have social importance. They are widely popular and are famous for particular category of animals.

Presently, it is essential to have specialised livestock market provided with adequate facilities. It will facilitate easy and convenient transactions of animals throughout the year. In the absence of this malpractice are taking place. Offenly illiterate farmers are exploited by the

middlemen, agents, dalas, traders etc. Elimination of middlemen in the livestock marketing is a great challenge before policy makers/Government. The bold and dynamic initiative of social leaders / Government policy makers in regulating livestock markets by eliminating dalals can only stop exploitation of farmers. As a matter of fact, replacement of animals is a regular phenomenon of most of the farmers throughout the year. However, during certain season the arrival and disposal and disposal of animals is highest. Dairy farm is profitable, when 25% uneconomical animals are replaced every year. In this age of competition running dairy farm in profit is becoming very difficult for which market intelligence is must to owner. However the farmers remain behind due to illiteracy and lack of guidance. They are also not well acquainted with their rights. Market functionaries exploit them by following unworthy operations. Many times marketing committee is also involved in the process.

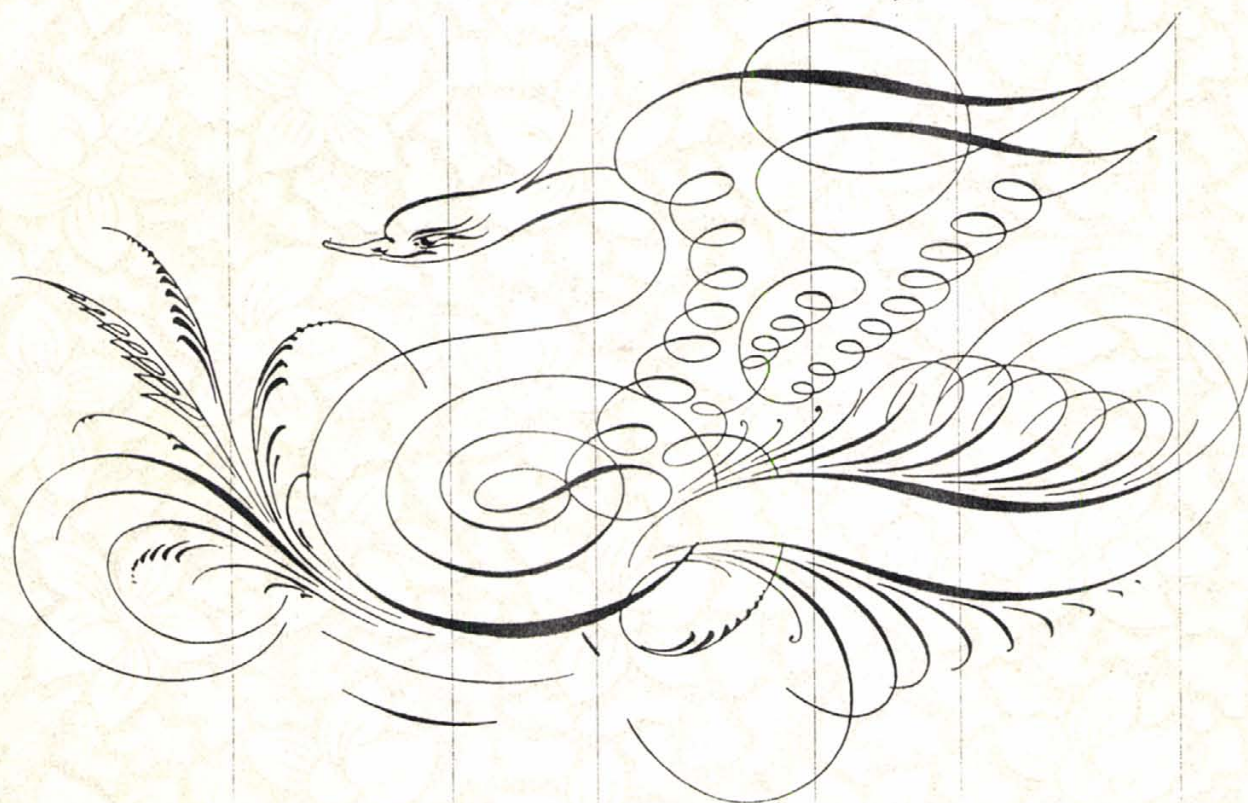
Many times due to faulty concepts farmer could not sale or purchase animal at optimum price. Age, sex, breed, coat colour, lactation number of animal, stage of pregnancy are the criteria used to decide the price. Apparently, in the case of crossbred cows the price is decided @ Rs.1000 /lit. of test day of milk the produces at the time of marketing the animals. The transaction is done only on visual observation which some times may lead to sever losses. Some times the transaction of diseased animals takes place in the market. Virtually, farmers are not aware about the diseases like TB, JD, Brucelosis etc. at the same time market committee also do not provide any check for such animals.

The services of veterinary doctors be provided by market committee for screening of animals for different diseases and pregnancy diagnosis.

Inspite of the fact, cattle marketing has been neglected by agricultural economist and available literature on marketing is very scanty. There is urgent need to guide farmer where and when to market cattle or from where he could get good animals at optimum price. It is, therefore, essential to study marketing pattern of cattle on scientific basis. The collected data will help to evaluate marketing system and impart desirable changes in cattle marketing. With a view to help the illiterate farmers in transaction of cattle the present investigation entitled, "Marketing systems of cattle in Ghodegaon market of Maharashtra" has been undertaken with the following objectives:

1. To study the trends in cattle marketing
2. To study factors affecting price of cattle marketed in cattle market
3. To study marketing systems of cattle
4. To study constraints in cattle marketing

REVIEW OF
LITERATURE



2. REVIEW OF LITERATURE

2.1. Trend in cattle marketing

2.1.1. Arrival

I. Cows

i. Monthwise trend in arrival

Raut *et al.* (1995) reported maximum arrival of cows in February and March in Dhule market. Similar results were revealed by Kaus *et al.* (1997) in South East Africa and Bockenhoff and Muller (1991) in Germany. However, Agarwal *et al.* (1989) reported higher arrival in January in Haryana.

ii. Seasonwise trend in arrival

Sale (1973) in Pune district reported maximum arrival of cows during winter season, similar results were also reported by Raut *et al.* (1995) in Dhule market, Verma *et al.* (1984) in Rajasthan and Patil *et al.* (2001) in M.S., Mazzocchi (1999) in Italy. While Agyemang *et al.* (1998) in Gambia and Smith (1993) in USA reported higher arrival of cows in summer.

II. Bullocks

i. Monthwise trend in arrival

Highest arrival was reported by Bankhele (1991) in October while Agarwal *et al.* (1989) reported it in December in Belhe market (Pune) and in Harayana respectively.

ii. Seasonwise trend in arrival

During winter season higher arrival of bullocks was reported by Sale (1973) in Pune, Rathod *et al.* (1978) in Karnataka and Verma *et al.* (1989) in Rajasthan.

2.1.2 Disposal

I. Cow

i. Monthwise trend in disposal

Raut *et al.* (1995) reported highest disposal in February and March in Dhule, similar results were also reported by Workman *et al.* (1998) in Malawi.

ii. Seasonwise trend in disposal

In winter higher disposal was reported by Patil *et al.* (2001) in M.S., Raut *et al.* (1995) in Dhule market, Sale (1973) in Pune Market, Verma *et al.* (1989) in Rajasthan and Pujari (1997) in Krishna valley.

II. Bullocks

i. Monthwise trend in disposal

Bankhele (1991) in Belhe market and Agarwal *et al.* (1989) in Harayana reported higher disposal during January and December, respectively.

ii. Seasonwise trend in disposal

Shanmugam and Balakrishnan (1994) and Anonymous(1956) reported highest demand of bollocks during late summer. However, Sale

(1973), Rathod *et al.* (1978) and Verma *et al.* (1989) reported higher disposal during winter season in Pune, Kolkota and Rajsthan respectively.

2.1.3 Price

I. Cow

i. Monthwise trend in price

Pujari (1997) in Krishna valley reported highest price of crossbred cow in the month of January. Similar results reported by Agarwal *et al.* (1989) in Harayana and Knootz *et al.* (1992) in Olkahama (USA) .

ii. Seasonwise trend in price

In Krishna valley Pujari (1997), Mazzocchi (1999) in Italy, Gillespie (2001) in USA, Moll *et al.* (1999) in Zambia and Bockenhoff and Muller (1991) in Germany reported the highest price during summer. Similar results were also reported by Anonymous (1956). However, Agyemang *et al.* (1998) in Gambia and Smith (1993) in USA reported highest price of cows in winter season.

II. Bullocks

i. Monthwise trend in price

Highest price was reported in the month of January by Bankhele (1991) and Agarwal *et al.* (1989) reported it in December month in Belhe market and Haryana respectively.

ii. Seasonwise trend in price

Anonymous (1956) , Shanmugam and Balakrishnan (1994) in Coimbatore and Arora and Pandey (1992) in Haryana reported highest price in rainy season. While Sale (1973), Rathod *et al.* (1978) and Verma

et al.(1989) found the same trend of bullock price during winter season in Pune, Karnatka and Rajasthan respectively.

2.2 Factors affecting price of animals

2.2.1 Breed

I. Cows

Rajan and Dhaka (2001) in Coimbatore market, Pujari (1997) in Krishna valley, Rajendran and Prabhakaran (1993) in Dharampuri (TN), Kareemulla and Srinivasan (1992) in Chittoor (AP) market, Makhijani (1961), Raut and Singh (1974) in India reported that prices of cows were affected by breed. Agarwal *et al.* (1989) and Mondal and Pandey (1995) in Haryana reported breed as most important factor affecting price of cows. They further reported that milch breeds fetched premium price over local cows. These results were in agreement with Anonymous (1956) in India.

II. Bullocks

Mishra and Nayak (1991), Patil *et al.*, (2001) reported that breed has significantly ($P < 0.05$) affected the price, They further stated red Kandhari bullocks fetches premium price in the market, which indicated influence of breed on pricing of bullocks in A.P. and M.S. respectively. Rathod *et al.* (1978) and Bankhele (1991) reported Khillar bullocks fetched maximum price in Karnataka and Pune markets respectively. Sale (1973) in Pune market found that the bullocks belonging to local breeds fetched higher prices than cross breed bullocks. Kareemulla and Srinivasan (1992) in A.P., Rajendran and Prabhakaran (1993) in T.N., and Anonymous (1956) in India were also of the same opinion. Shanmugam and

Balakrishanan (1994) reported that Kangayam bullock fetched higher price than local breeds in T.N..

2.2.2 Coat colour of animal

I. Cows

Gillespie (2001) in USA, Raut and Singh (1974) in Dhule and Pujari (1997) in Krishna valley reported that coat colour had significant effect on the price of cows. Kaushish (2001) in India had the similar opinion. Anonymous (1956) revealed that auspicious and unsuspecting marks also affected the price of cows in India. Generally black and white patches fetched the higher price and off colour reduced the price, was reported by Makhijani (1961) in India.

II. Bullocks

Rathod *et al.* (1978) in Karnataka, Arora and Pandey (1984) in Haryana and Mishra and Nayak (1991) in Bhubaneshwar found that white coloured bullocks fetched higher price over mixed colour pattern of bullocks. Rathod *et al.* (1978) further added red and black coat colour depressed price below average, mixed coloured bullocks got average prices in the market. Bankhele (1991) in Belhe market, Sale (1973) in Pune and Patil *et al.* (2001) also reported similar results in the case of bullocks in M.S.

2.2.3 Age

I. Cow

Kareemulla and Srinivasan (1992) in Chittoor market reported that cow having age 4 1/2 - 7 year fetched maximum price. Makhijani (1961) in India, Pujari (1997) In Krishna valley, Mondal and Pandey

(1995) and Raut and Singh (1974) in Haryana market reported that age of cows influenced price of cows. Similar results were interpreted Anonymous (1956) and Kaushish (2001) in India, Shanmugam and Balakrishnan (1994) in Coimbatore market, Gillespie (2001) in USA, and Agyemang ^{et al.} (1998) in Gambia. Shanmugam and Balakrishnan (1994) further reported that cows fetched highest price at fourth lactation. In the case of beef cows price was dependant on slaughter age was reported by Kretter (1998) in USA, Moriwaki and Komastu (1998) and Kitamura *et al.* (1998) in Japan. However, Agarwal *et al.*, (1989) in Haryana reported that price increased upto 5th lactation, further it decreased in the case of cows.

II. Bullock

Shanmugam and Balakrishnan (1994) reported that bullocks fetched highest price at the age of 7th year in Coimbatore. Patil *et al.* (2001) in MS also observed highest price during 5-7th year of age. Arora and Pandey (1984) reported highest price at 6th year of age in Haryana. These results were in agreement with Kareemulla and Srinivasan (1992) in AP, Rathod *et al.*(1978) in Karnataka, Mishra and Nayak (1991) in Bhubaneswar and Anonymous (1956) in India.

2.2.4 Category of animal

Lactation and pregnancy stages in the life of cows had significant effect on price of cows was reported by Makhijani (1961) in India, Kareemulla and Srinivasan (1992) in Chitoor market, Mondal and Pandey (1995) and Agarwal *et al.*(1989) in Haryana, and Rathod *et al.* (1978) in Karnataka. They further reported that lactating and pregnant cows fetched higher price than non lactating (dry) and non pregnant cows.

Similar results were also reported by Anonymous (1956), Chacko (1991) in Kerala, Pujari (1997) in Krishna valley, Shanmugam and Balkrishanan (1994) in Coimbatore, Knootz (1992) in USA, Sastri (1995) and Kaushish (2001) in India.

2.3 Marketing systems of cattle

2.3.1 Farmer / producer - farmer / consumer

Bankhele (1991) in Belhe market Pune, Pujari (1997) in Krishana valley, Kareemulla and Srinivasan (1994) in Chitoor, Rajan and Dhaka⁽²⁰⁰¹⁾ in Coimbatore, Singh (1988) in Haryana, Sharma *et al.* (2001) in Himachal Pradesh, Kaushish (2001) and Sastri (1995) in India. Singh and Patel (1981) reported same channel in the case of buffaloes in Haryana.

2.3.2 Farmers / producer - mm / broker - farmer / consumer

Bankhele (1991) in Belhe, Pujari (1997) in Krishna valley, Sastri (1995) in India, Sharma *et al.* (2001) in Himachal Pradesh, Gillespie (2001) in USA, Bruyn *et al.* (2001) in Africa and Liager *et al.* (2000) in Namibia in cows and Singh and Patel (1981) reported in buffalo market.

2.3.3 Farmer - trader - farmer

In the case of cattle marketing, farmer - trader - farmer channel was reported by Singh (1988) in Haryana, Rajan and Dhaka (2001) in Coimbatore, Kareemulla and Srinivasan (1992) in Chitoor, Kaushish (2001) in India and these results were in agreement with Singh and Patel (1981) in the case of buffaloes in Haryana.

2.3.4 Farmer - mm - trader - mm - farmer

Prevalence of farmer-mm-trader-farmer as marketing channel in cattle marketing was reported by Rajan and Dhaka (2001) in Coimbatore market, Bankhele (1991) in Belhe market, Kaushish (2001) and Sastri (1995) in India. In the case of beef cattle Talukadar and Singh (1995) in Meghalaya, Gilliespie (2001) in USA, Bruyn *et al.* (2001) in Germany, Liager *et al.* (2001) in Namibia and Soto-para *et al.* (1998) in Venezuela reported similar marketing channel.

2.3.5 Farmer - trader - wholesale trader - farmer

This marketing channel was reported by Kareemulla and Srinivasan (1994), Singh (1988), Rajan and Dhaka (2001) in cattle markets and Singh and Patel (1981) in buffalo market.

2.4 Constraints in cattle marketing

1. inadequate infrastructure

Pujari (1997) in Krishna valley, Rajan and Dhaka (2001) in Coimbatore, Sharma *et al.* (2001) in Himachal Pradesh, Gaikwad (1985) in Dhule, Dhume (1985) in MS and Moll *et al.* (1999) in Zambia observed inadequate infrastructure facilities than required at market yard. Pujari (1997) in Krishna valley and Shah (2001) in Kolkata market further reported congestedness and absence of parking, loading and unloading platform, shade, lodging facilities in the respective markets. Similar constraints reported by Sharma *et al.* (2001) in Himachal Pradesh and Kareemulla and Srinivasan (1994) in Chitoor market.

2. Exploitation by middle men

Highest commission, highest market charges, flexible brokerage, undercover method were major constraints faced by farmers was reported by Shah (2001) in Kolkata, Khan and Rao (1998) in Karnataka, Mulla (1997) in Haveri, Talukdar and Singh (1995) Meghalaya, Singh (1988) in Haryana, Raut *et al.* (1995) in Dhule, Kareemulla and Srinivasan (1994) in AP, Pujari (1997) in Krishna valley, Kaushish (2001) in India, Kareemulla and Srinivasan (1992) in AP, Bankhele (1991) Pune, Arora and Pandey (1992) in Haryana, Little *et al.* (1995) in South Somlia, Gopalrao and Iqbaluddin (1988) in India and Anderson (1998) in Gambia.

3. Expenses on preparation of animals for market

Khan (1998) reported production of animals for selling as costlier job, Anonymous (1956) also reported similar constraints in marketing of cattle in India.

4. Non availability of feed and water

Pujari (1997) in Krishna valley, Sharma *et al.* (2001) in Himachal pradesh, Gaikwad (1985) in MS reported inadequate and costly water supply as major constraint.

5. Malpractices

Rajan and Dhaka (2001) in Coimbatore, Arora and Pandey (1984) in Haryana, Kareemulla and Srinivasan (1994) in AP, Sharma *et al.* (2001) in Himachal pradesh, and Gopalrao and Iqbaluddin (1988), Sastri

(1995), Sindhu (1960) and Joshi (1950) in India reported many malpractice were followed by sellers, traders to fetch highest returns from cattle.

6. Less credibility of animals

Schroeder ^{et al.} (1998) , Viaene ^{et al.} (1998), Kaus *et al.* (1997) and Sindhu (1960) reported unreliability about health and performance was major constraint in cattle marketing.

7. Improper functioning of markets

Pujari (1997) in Krishna valley, Haan *et al.* (1999) in South Africa reported improper functioning of market boards and committees as basic and major constraint

8. Marketing expenditure

Anderson (1998) in USA, Pujari (1997) in Krishna valley and Khan (1998) in India reported higher marketing cost as a constraint. Rajan and Dhaka (2001) in Coimbatore further reported that highest cost incurred on cross breed cattle than local breeds.

9. Improper pricing

Agyemang *et al.* (1998) and Kareemulla and Srinivasan (1992) reported improper pricing policies in animal market causing sever losses to buyers and sellers in Gambia and AP respectively.

10. Inadequate market information

Jack *et al.* (2000) in UK, Anderson (1998) in USA, Pujari (1997), reported non-availability reliable market information as hindrance

in Krishna valley, Kaushish (2001) in India and Sharma *et al.* (2001) in Himachal pradesh in the case of cattle marketing.

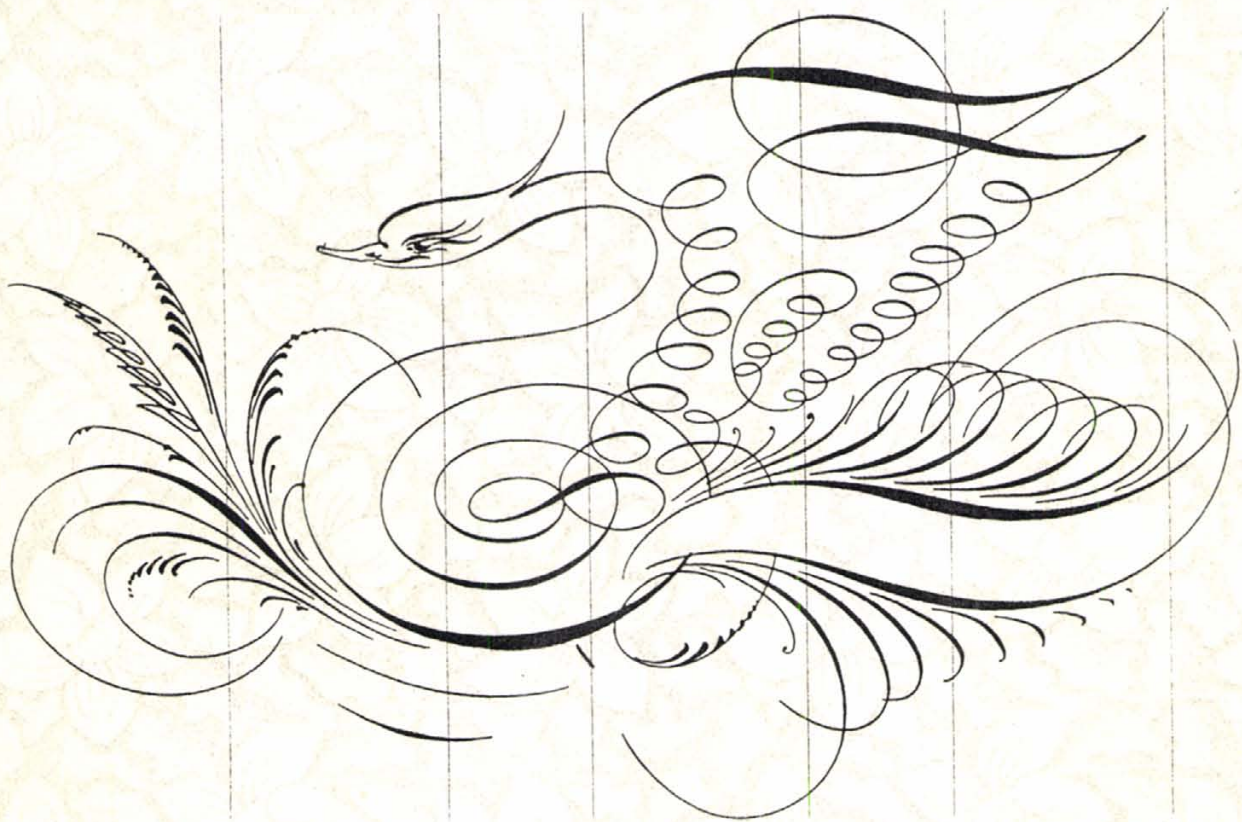
11. High transport expenses

Khan and Rao (1998) in Belgaum reported higher transportation cost as hindrance in cattle marketing. Sharma *et al.* (2001) in Himachal pradesh, and Anonymous (1956) in India was also of same opinion.

12. Highest investment in purchasing of animals

Sharma *et al.* (2001)) in Himachal pradesh, Rajendra and Prabakaran (1993) in TN, Kolajo and Martin (1994) in USA, Viaene *et al.* (1998) in Belgium reported high investment and non availability of finance at affordable interest rate as a major hindrance.

MATERIALS AND
METHODS



3. MATERIAL AND METHOD

3.1 Source of data

The data for investigation were collected from Krishi Utpanna Upbaazar Samitee, Ghodegaon (Dist. Ahmednagar). It is leading cattle market of this region and have wide variety of animals. Similarly, number of transactions are also considerably large as compared to the other markets of the surrounding region. Large number of buyers from nearby districts visits market regularly. It is also leading milk producing tract.

3.2 Location and climate

Ghodegaon cattle market is located in Newasa tahasil of Ahmednagar district of Maharashtra. It is situated on Nagar-Aurangabad state highway near by Mula river bank. It is 40 k.m. away from Ahmednagar city.

The Ghodegaon is situated at an elevation of 659 m above MSL and on 19° 32" North latitude and 74° 46" East longitude. The average annual precipitation is 550 mm.

3.3 Collection of data

Two types of data were collected from Ghodegaon market. Primary data were collected by survey method for the year 2002-03. The set of questionnaire in the Marathi language were used for data collection. Separate questionnaires were prepared for collecting information from buyers and sellers. (Appendix I and II). Randomly 550 farmers were interviewed and considered for the primary data to reveal effect of

different factors on the price of cows and bullocks, marketing systems and constraints in cattle marketing.

The secondary data were collected from market committee for last four years (1998-2002) on pretested schedule (Appendix-III).

3.4 Standardization of data

The data were standardized to obtain more accurate and reliable estimates. The primary data on price of cattle were collected randomly upto 8 years age of animal.

3.5 Classification and weightages

The data were collected according to breed, sex, coat colour, age and category of animal. The details of the classification is as under.

I) Breed :

Sr. No.	Particulars	Female	Male
1	HF cross	4	1
2.	Jersey cross	3	2
3	Khillar	2	4
4	Local	1	3

II. Coat colour

Sr. No.	Particulars	Female	Male
1.	Black & white	4	1
2.	Brown	3	2
3.	White	2	4
4.	Other	1	3

III. Age (year)

Sr. No.	Particulars	Female	Male
1.	0-1	1	1
2.	1-3	2	2
3.	3-7	3	3

IV. Category of animal

Sr.No.	Particulars	Cows (including young stock)	Cows (excluding young stock)
1.	Calf	1	-
2	Heifer non pregnant	2	1
3	Non pregnant dry cows	3	2
4	Pregnant lactating cows	4	3
5	Non preg. Lactating cows	5	4
6	Pregnant dry cows	6	5

3.6 Statistical methods of data analysis

The data collected were further processed, tabulated and analysed. The methodology adopted for each aspect is given under the following sub heads.

3.6.1 Time series analysis

The data were collected for four years period (October 1998 to September 2002) for cows and bullocks from the market committee. The data were analyzed for arrival, disposal and price of animals by time series analysis. For removing seasonal fluctuations moving average method was used. In this method average value of 4 months was secured and this average was taken as normal or trend value for unit of time falling at the middle of period covered in calculation of the average. The period of moving average was decided as four months (season) by considering length of cycle.

The month wise moving averages are calculated as

$$\frac{a+b+c+d}{4} = x \quad \frac{b+c+d+e}{4} = y \quad \frac{c+d+e+f}{4} = z$$

Where, a,b,c,d,e...= monthwise observations

x,y,z...= trend value

3.6.2 Multiple regression equation

I) Cows

Price of cow was considered as dependant variable and factors like breed, age, coat colour and category were considered as independent variables.

i) Cows including young stock

Following regression equation was fitted :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where,

a = intercept $b_1, b_2, b_3, b_4 =$ regression coefficient

$X_1 =$ breed of cow, $X_2 =$ coat colour of cow,

$X_3 =$ Age of cow $X_4 =$ category of cow

ii) Cow excluding young stock

Between economical age group i.e. heifers and adults. Following regression equation was fitted :

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4$$

Where,

a = intercept $b_1, b_2, b_3, b_4 =$ regression coefficient

$X_1 =$ breed of cow, $X_2 =$ coat colour of cow,

$X_3 =$ Age of cow $X_4 =$ category of cow

II) For Bullock

Breed, coat colour and age were independent variables affecting price of bullocks. Following regression equation was fitted

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3$$

Where

a = intercept $b_1, b_2, b_3, b_4 =$ regression coefficient

$X_1 =$ breed of bullock, $X_2 =$ coat colour of bullock ,

$X_3 =$ age of bullock,

RESULTS AND
DISCUSSION



4. RESULT AND DISCUSSION

The results obtained in the investigation entitled "Marketing systems of cattle in Ghodegaon market of Maharashtra" have been presented and discussed in this chapter.

4.1 Trends in cattle marketing

Trend is that component of variation which revealed general direction of change over a period of time.

4.1.1 Trend in arrival

I. Cow

i) Monthwise trend in arrival

The average arrivals during the year 1998-99, 1999-00, 2000-01 and 2001-02 were 1422, 1771, 1446 and 1858, respectively. The highest arrival was reported in month of July (1868), June (2155), November (1987) and August (3703) in the year 1998-99, 1999-00, 2000-01, 2001-02, respectively (Table 1) (fig.1). The results revealed that overall average arrival of cows irrespective of year were 1542 ± 154.10 which ranged from 1003 to 2155 (Table 2).

Raut *et al.* (1995) in Dhule market, Kaus *et al.* (1997) in Australia and Bockenhoff and Muller (1995) in Germany reported highest arrival in February and March. However, Agarwal *et al.* (1989) reported highest arrival of cows in the month of January in Haryana State.

The trend of arrival indicated that depending on market infrastructure, it was almost stable. The shortage of green roughages during

Table 1. Monthwise arrival of cows and four monthly moving averages

Month	Arrival	Moving av. of four month	Month	Arrival	Moving av. of four month
Oct. 98	1724	-	Oct. 00	1660	1402
Nov. 98	1557	1539	Nov. 00	1871	1631
Dec. 98	1345	1402	Dec.00	1545	1526
Jan. 99	1531	1322	Jan. 01	1446	1420
Feb. 99	1175	1353	Feb. 01	1240	1366
Mar. 99	1236	1269	May.01	1449	1339
Apr. 99	1470	1321	April 01	1330	1436
May 99	1194	1479	May 01	1338	1324
June 99	1383	1477	June 01	1628	1319
July 99	1868	1569	July 01	1003	1367
Aug. 99	1462	1725	Aug. 01	1310	1338
Sept. 99	1563	1715	Sept 01	1528	1557
Oct. 99	2006	1623	Oct. 01	1512	1529
Nov. 99	1829	1828	Nov 01	1877	1435
Dec. 99	1895	1690	Dec. 01	1200	1332
Jan 00	1581	1667	Jan 02	1150	1218
Feb. 00	1453	1510	Feb. 02	1100	1255
Mar. 00	1738	1386	Mar. 02	1419	1351
Apr. 00	1266	1562	Apr. 02	1350	1607
May 00	1087	1452	May 02	1535	1704
June 00	2155	1412	June 02	2122	2292
July 00	1301	1647	July 02	1810	2309
Aug 00	1104	1523	Aug 02	3703	-
Sept. 00	2026	1665	Sep.02	3511	-

June to August might be compelling farmers to sell their animals. As the situation improves after the rainy season and ample green roughages were available, farmers found it convenient and economical to rear cows for milk. Therefore, arrival of cows during November might be at the highest level.

ii) Seasonwise trend in arrival

The highest average seasonal arrival of cows was 1609 ± 143.27 in winter followed by 1567 ± 129.19 in rainy season and 1331 ± 178.12 in summer season (Table 2). The highest arrival of cows were observed in the rainy season during 1998-99 and 2001-02. In summer during 1999-2000. In winter during 2000-2001, followed by summer season during 1999-2000. Raut *et al.* (1995) in Dhule, Sale (1973) in Pune in M.S., Patil *et al.* (2001) and Verma *et al.* (1989) also reported higher arrival in winter season. However, Agyemang (1998) in Gambia and Smith (1993) in USA during summer season.

Winter is the season when majority of cows were pregnant. They calved in late winter or in summer. Pregnant cows fetched higher prices, in summer per liter price of milk is higher hence higher arrival in winter and summer was noticed. Higher arrival may be because it is the season of marriages and for contingency expenses farmers used to sell animals for cash.

Table 2. Seasonwise arrival, disposal and prices of cows during investigation period

Year	Season	Arrival	Disposal	Price
1998-99	Winter	1539	511	5749
	Summer	1269	460	5321
	Rainy	1459	466	5328
	Average	1422	479	5466
1999-2000	Winter	1829	424	3645
	Summer	1386	451	4777
	Rainy	1647	674	5090
	Average	1771	516	4504
2000-01	Winter	1631	489	5307
	Summer	1339	387	7734
	Rainy	1367	352	5329
	Average	1446	409	6123
2001-02	Winter	1435	360	5968
	Summer	1351	509	5463
	Rainy	2787	1088	4473
	Average	1858	652	5301
	Average Winter	1609 ± 143.27	446 ± 89.01	5168 ± 718.43
	Average Summer	1331 ± 178.12	452 ± 92.13	5824 ± 813.61
	Average Rainy	1567 ± 126.19	635 ± 111.10	4956 ± 726.02
	Overall average	1542 ± 154.10	511 ± 105.47	5314 ± 809.78

II) Bullocks

i) Monthwise trend of arrival

The overall average arrival of bullocks was 2003 ± 275.25 irrespective of year and ranged from 911 to 2737 and the average arrivals were 2258 (1998-99), 2220 (1999-00), 1812 (2000-01) and 1722 (2001-02) (Tab-4). The highest arrival of bullocks in market were observed in the month of October during the year 1998-99, 1999-00, 2000-01 as 3001, 2991, 2322 and 2400, respectively (Tab-3) (Fig.2). Similar results were reported by Bankhele (1991) in Belhe market.

During 2001-02, highest arrival was reported during November (2600). However Agarwal *et al.* (1989) in Haryana reported higher arrival in the month of December. It was because of the fact that kharif is major season and bullocks can't be economically reared through out year hence sold after completion of agricultural operation.

ii) Seasonwise trend of arrival

The seasonwise highest average arrival was 2302 ± 47.83 during investigation period in winter season followed by 1938 ± 213.23 in summer and 1770 ± 446.76 in rainy season (Tab-4). Without any contradiction highest arrival of bullocks in market were reported in winter season during investigation period. Sale (1973) in Pune market, Rathod *et al.* (1978) in Karnataka and Verma *et al.* (1989) in Rajasthan revealed similar results. This trend was because of general tendency of small farmers to sell bullocks after completion of agricultural operations in kharif season.



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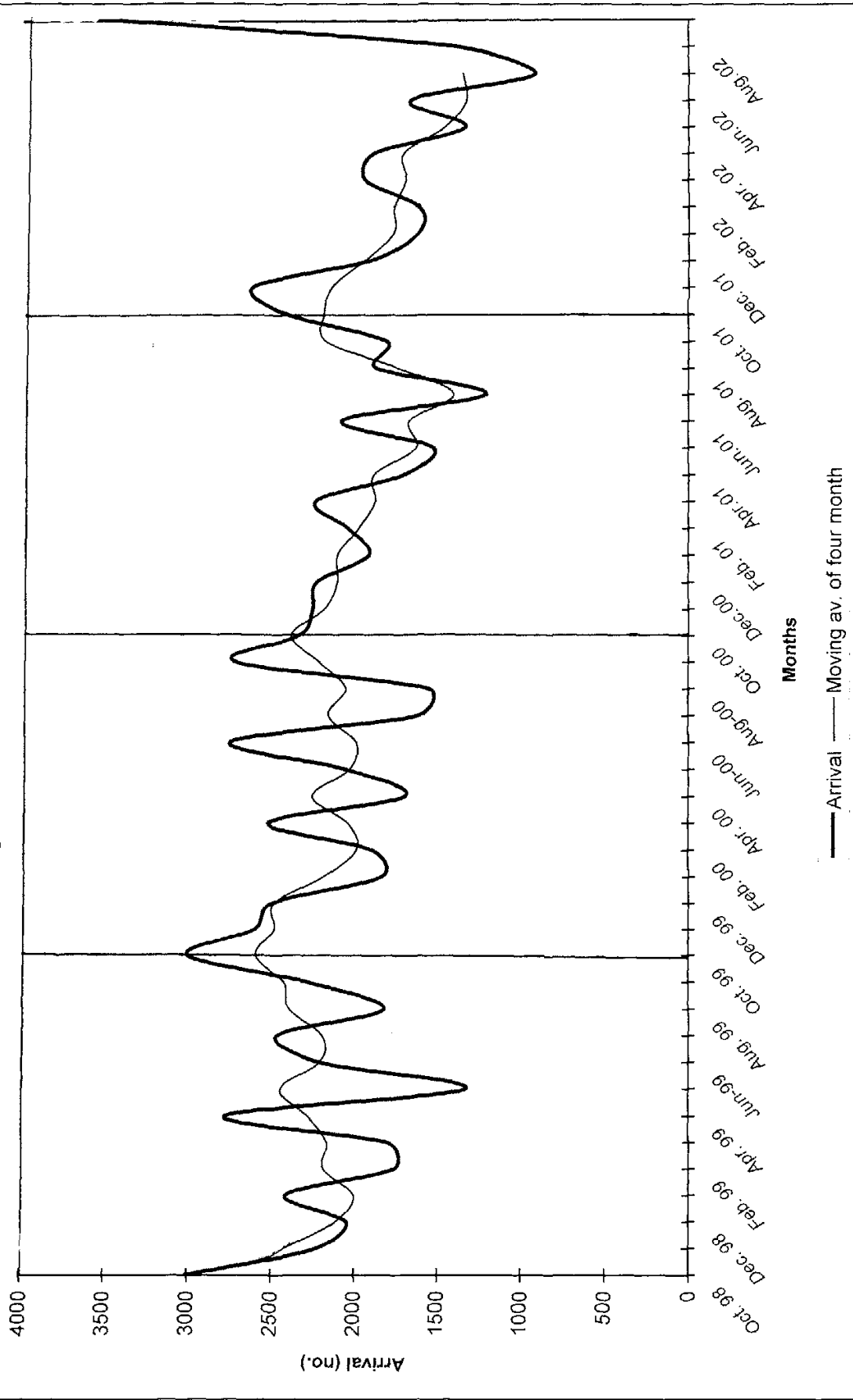
Table 3. Month wise arrival of Bullocks and four monthly moving averages

Month	Arrival	Moving av. of four month	Month	Arrival	Moving av. of four month
Oct. 98	3001	-	Oct. 00	2322	2372
Nov. 98	2228	2421	Nov. 00	2244	2171
Dec. 98	2044	2110	Dec.00	2215	2096
Jan. 99	2409	2002	Jan. 01	1906	2095
Feb. 99	1758	2184	Feb. 01	2035	1966
Mar. 99	1798	2164	May 01	2225	1869
Apr. 99	2771	2275	April 01	1698	1877
May 99	1327	2440	May 01	1519	1621
June 99	2204	2202	June 01	2066	1662
July 99	2460	2189	July 01	1202	1395
Aug. 99	1817	2385	Aug. 01	1862	1733
Sept. 99	2273	2418	Sept 01	1800	2166
Oct. 99	2991	2586	Oct. 01	2400	2175
Nov. 99	2591	2476	Nov 01	2600	2128
Dec. 99	2489	2476	Dec. 01	1898	1929
Jan 00	1832	2178	Jan 02	1613	1762
Feb. 00	1883	1979	Feb. 02	1606	1755
Mar. 00	2508	2033	Mar. 02	1929	1684
Apr. 00	1692	2246	Apr. 02	1873	1696
May 00	2048	2021	May 02	1326	1447
June 00	2737	1985	June 02	1656	1321
July 00	1607	2150	July 02	911	1344
Aug 00	1549	2047	Aug 02	1392	-
Sept. 00	2708	2206	Sep.02	3511	-

Table 4. Seasonwise arrival, disposal and prices of bullocks during investigation period

Year	Season	Arrival	Disposal	Price
1998-99	Winter	2421	398	3434
	Summer	2164	470	3288
	Rainy	2189	386	3534
	Average	2258	418	3419
1999-2000	Winter	2476	352	3081
	Summer	2033	388	3787
	Rainy	2150	764	3752
	Average	2220	501	3540
2000-2001	Winter	2171	576	3854
	Summer	1869	594	4737
	Rainy	1395	419	3030
	Average	1812	529	3874
2001-2002	Winter	2138	358	3879
	Summer	1684	652	2378
	Rainy	1344	614	2001
	Average	1722	541	2753
	Average winter	2302 ± 47.83	421 ± 79.8	3562 ± 261.23
	Average summer	1938 ± 213.23	526 ± 63.13	3548 ± 348.19
	Average rainy	1770 ± 448.76	546 ± 110.03	3079 ± 416.25
	Overall average	2003 ± 275.25	497 ± 67.14	3397 ± 274.19

Fig - 2 Trend in arrival of bullocks



4.1.2 Trend in disposal of animals

I. Cow

i) Monthwise trend of disposal

The overall average disposal was 511 ± 105.47 irrespective of year and ranged from 250 to 1667 (Table 2). No specific trend was observed in case of disposal of cows. Highest disposal was reported January (581), June (909), October (533) and August (1677) during 1998-99, 1999-2000, 2000-2001 and 2001-02 respectively (Tab-5) (Fig.3). It may be due to year round demand for milch purpose cows. However, Raut *et al.* (1995) in Dhule market and Workman *et al.* (1998) in USA reported higher disposal of cows during February and March.

ii) Seasonwise trend of disposal

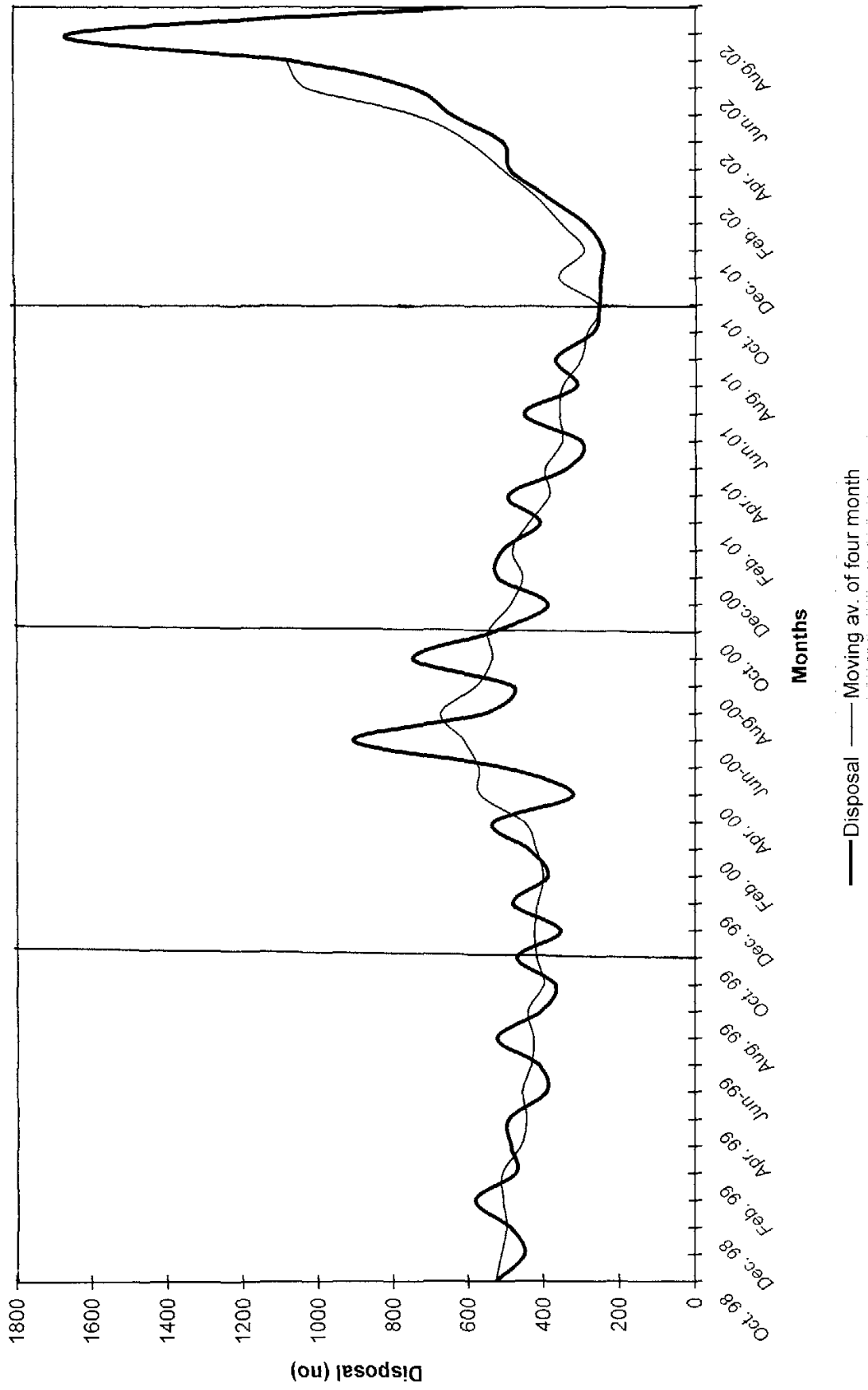
The highest average disposal was observed in rainy season 635 ± 111.10 followed summer 452 ± 92.13 and winter 446 ± 89.01 (Table 2). The average disposal were ~~479~~, 516, 409 and ~~652~~ for the year 1998-99, 1999-200, 2000-2001 and 2001-2002, respectively (Tab-2). The higher disposal was observed during winter season in 1998-99 (511) and 2000-01 (489). It may be because higher milk prices during summer hence higher demand observed during late winter. Similar results were revealed by Patil *et al.* (2001), Verma *et al.* (1989), Sale (1973), Pujari (1997) and Raut *et al.* (1995).

During the year 1999-2000 (674) and 2001-02 (~~1007~~) highest disposal was observed in rainy season. It may be because of green higher availability of ~~green~~

Table 5. Month wise disposal of Cows and four monthly moving averages

Month	Disposal	Moving av. of four month	Month	Disposal	Moving av. of four month
Oct. 98	527	-	Oct. 00	533	548
Nov. 98	450	511	Nov. 00	389	489
Dec. 98	487	498	Dec.00	522	458
Jan. 99	581	507	Jan. 01	512	485
Feb. 99	472	508	Feb. 01	410	440
Mar. 99	486	460	May 01	496	387
Apr. 99	492	445	April 01	341	398
May 99	391	455	May 01	300	352
June 99	412	433	June 01	453	359
July 99	523	427	July 01	315	352
Aug. 99	406	442	Aug. 01	369	302
Sept. 99	368	400	Sept 01	270	286
Oct. 99	470	419	Oct. 01	255	255
Nov. 99	355	424	Nov 01	250	360
Dec. 99	481	416	Dec. 01	244	294
Jan 00	389	401	Jan 02	290	354
Feb. 00	439	421	Feb. 02	390	420
Mar. 00	535	451	Mar. 02	490	509
Apr. 00	322	568	Apr. 02	509	599
May 00	507	573	May 02	646	745
June 00	909	613	June 02	752	1034
July 00	555	674	July 02	1071	1088
Aug 00	481	580	Aug 02	1667	
Sept. 00	750	538	Sep.02	563	

Fig - 3 Trend in disposal of cows



fodder and less price for milk which ultimately lowers down price hence, tendency to purchase at cheaper rate.

II) Bullocks

i) Monthwise trend of disposal

During the investigation period the overall average disposal of bullocks was 497 ± 67.14 irrespective year which range from 271 to 929 (Table 4). The highest disposal was observed in March (580), September (929), December (713) and June (705) during the year 1998-99, 1999-2000, 2000-2001, 2001-02, respectively (Tab-6) (Fig.4). No specific trend was observed. The reason may be cheaper rate or year around demand. However, Bankhele (1991) in Belhe market reported highest demand during January and in Haryana Agarwal *et al.* (1989) in the month of December.

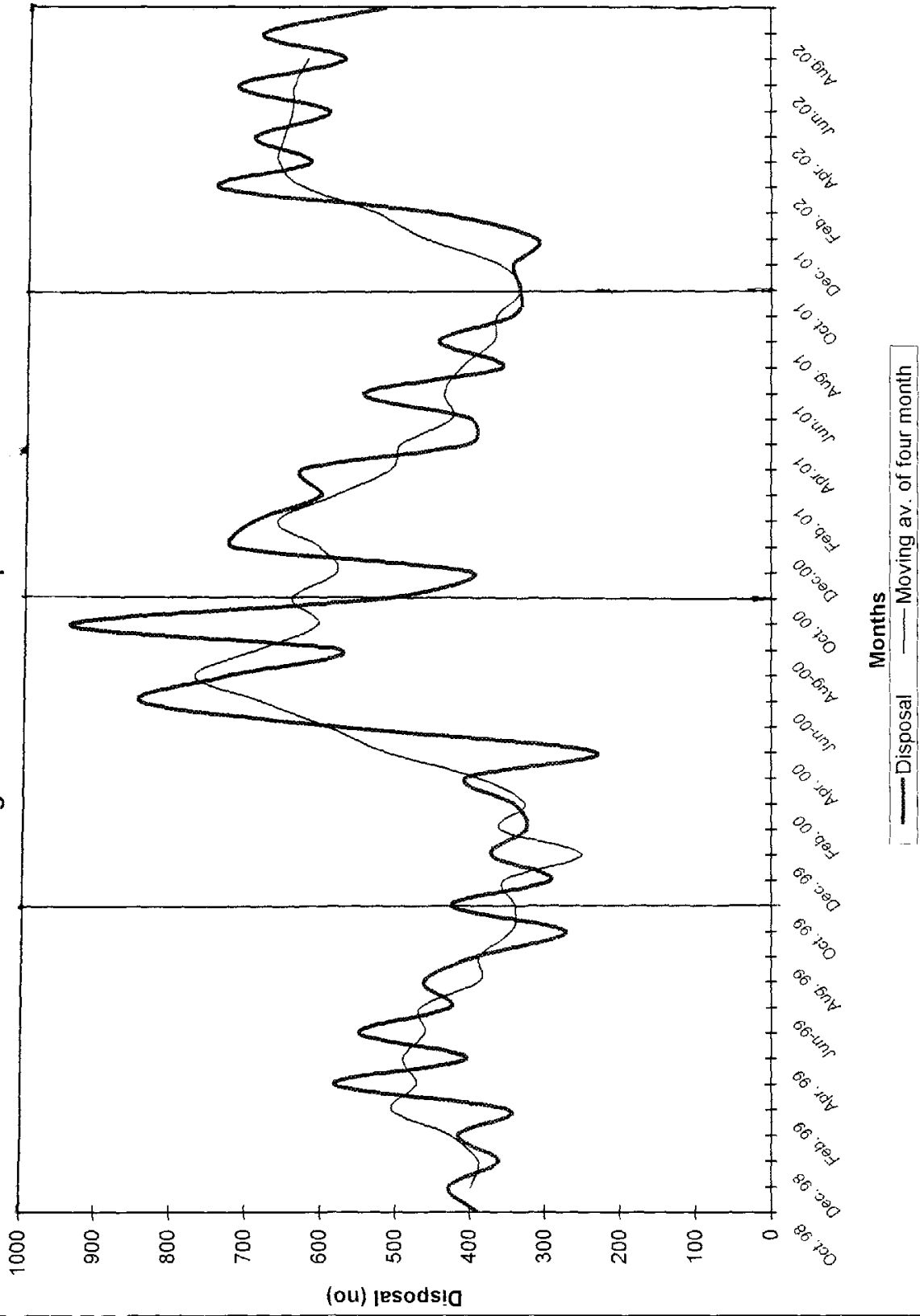
ii) Seasonwise trend of disposal

The average seasonwise disposal was 546 ± 110.03 , 526 ± 63.13 and 521 ± 79.8 in rainy, summer and winter season, respectively (Tab-4) for bullocks. During the year 1998-99 (470) and 2001-02 (652) was highest disposal observed in summer it may be because of commenset of agricultural operations which increases demand. Similar results were reported by Shanmugum and Balakrishnan (1999) and Anonymous (1956). During the year 1999-2000 (764) in rainy season while in the year 2000-01 (576) during winter season (Tab-4), similar results were revealed by Sale (1973), Rathod *et al.* (1995) and Verma *et al.* (1989) in Pune ,Karnatka and Rajsthan, respectively.

Table 6. Monthwise disposal bullocks and four monthly moving averages.

Month	Disposal	Moving av. of four month	Month	Disposal	Moving av. of four month
Oct. 98	388	-	Oct. 00	508	636
Nov. 98	427	398	Nov. 00	395	576
Dec. 98	361	388	Dec.00	713	598
Jan. 99	415	426	Jan. 01	686	655
Feb. 99	348	504	Feb. 01	597	576
Mar. 99	580	470	May 01	622	504
Apr. 99	403	489	April 01	399	490
May 99	547	459	May 01	397	423
June 99	426	465	June 01	540	433
July 99	460	386	July 01	355	410
Aug. 99	388	386	Aug. 01	440	367
Sept. 99	271	343	Sept 01	340	363
Oct. 99	423	339	Oct. 01	331	330
Nov. 99	290	352	Nov 01	340	358
Dec. 99	370	250	Dec. 01	310	458
Jan 00	324	359	Jan 02	450	525
Feb. 00	340	325	Feb. 02	730	619
Mar. 00	403	388	Mar. 02	610	652
Apr. 00	231	511	Apr. 02	684	646
May 00	577	590	May 02	585	635
June 00	835	676	June 02	705	632
July 00	718	764	July 02	565	614
Aug 00	572	681	Aug 02	673	-
Sept. 00	929	601	Sep.02	512	-

Fig - 4 Trend in disposal of bullocks



4.1.3 Trend in price of animals

I. Cows

i) Monthwise trend of price

The results revealed that overall average price of cows irrespective of year was Rs. 5314 ± 809.78 which ranged from Rs.2924 to Rs.1925 (Table 2). No specific trend was observed in price of cows. This may be because of year round demand for cows. However, the highest price was reported in January (Rs. 6576) in 1998-99. Similar results were reported by Pujari (1997), Agarwal *et al.* (1989) and Knootz *et al.* (1992). In the year 1999-2000, 2000-01, 2001-02, the highest price of cows was observed during the month of August (Rs. 5825), April (Rs.7925) and October (Rs.6863), respectively (Tab-7) (Fig.5).

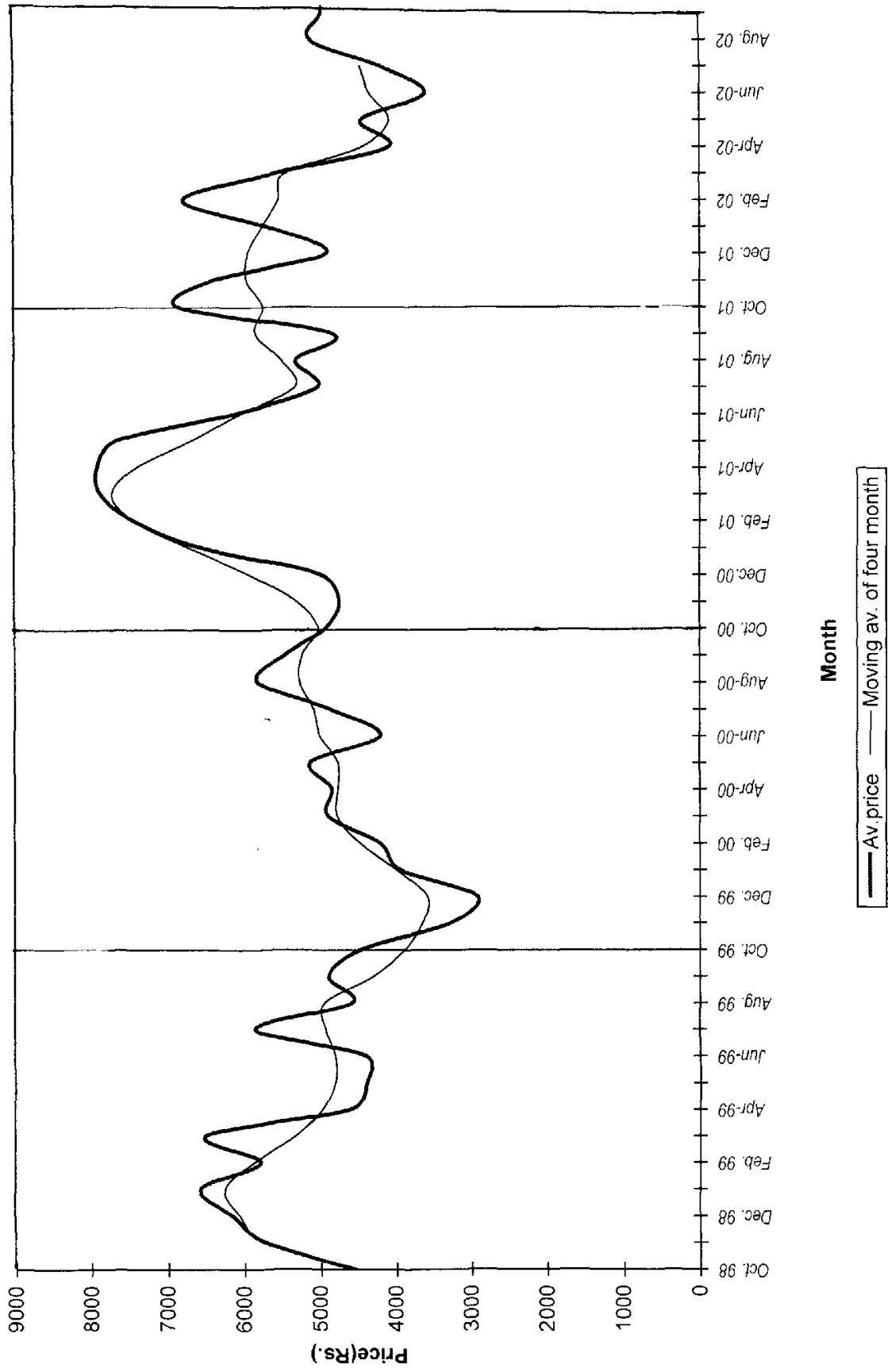
ii) Seasonwise trend of price

The average seasonwise prices of cows were found highest in summer Rs. 5824 ± 813.61 followed by winter Rs. 5168 ± 718.43 and rainy season 4956 ± 726.02 , the average prices were Rs. ~~5466~~, Rs.4504, Rs. ~~6123~~ and Rs. ~~5901~~ during the year 1998-99, 1999-2000, 2000-2001 and 2001-2002, respectively (Tab-2). Highest prices of cows were observed in winter season during year 1998-99 (Rs. ~~5749~~) and 2001-02 (Rs. 5968). Higher arrival of pregnant cows raises prices of cows. Similar results were reported by Agyemang *et al.* (1998), Smith (1993), Anonymous (1956).

Table 7. Monthwise trend in Price cows and four monthly moving averages

Month	Price	Moving av. of four month	Month	Price	Moving av. of four month
Oct. 98	4544	-	Oct. 00	4932	5031
Nov. 98	5724	5752	Nov. 00	4743	5307
Dec. 98	6150	6060	Dec.00	4990	5937
Jan. 99	6576	6254	Jan. 01	6562	6722
Feb. 99	5789	5866	Feb. 01	7454	7456
Mar. 99	6500	5321	May 01	7883	7734
Apr. 99	4600	4973	April 01	7925	7400
May 99	4394	4811	May 01	7674	6688
June 99	4399	4806	June 01	6119	6038
July 99	5849	4930	July 01	5036	5329
Aug. 99	4581	4944	Aug. 01	5325	5515
Sept. 99	4892	4296	Sept 01	4837	5856
Oct. 99	4454	3882	Oct. 01	6863	5754
Nov. 99	3257	3645	Nov 01	6400	5968
Dec. 99	2924	3584	Dec. 01	4918	5951
Jan 00	3946	3994	Jan 02	5690	5755
Feb. 00	4211	4477	Feb. 02	6795	5548
Mar. 00	4898	4777	Mar. 02	5616	5463
Apr. 00	4852	4768	Apr. 02	4092	4442
May 00	5122	4763	May 02	4449	4083
June 00	4199	5006	June 02	3612	4339
July 00	4880	5090	July 02	4180	4473
Aug 00	5825	5274	Aug 02	5118	-
Sept. 00	5458	5239	Sep.02	4980	-

Fig - 5 Trend in price of cows



In rainy season during year 1999-2000 (Rs.7734) the price of cow were highest. This may be because of higher demand and in summer during 2000-01 (Rs.5966) similar results were revealed by Pujari (1997), Gillespie (2001), Moll et.al. (1999), Macchochi (1997) and Bockenhoff and Muller (1991).

II) Bullocks

i) Monthwise trend of price

For the investigation period average price was observed Rs.3397 \pm 274.19 irrespective of year which ranged from Rs.1659 to Rs.5806 (Table 4). In the month of January higher prices were reported during 1998-99 (Rs.4475) and 2000-01 (Rs.5778) (Tab-8) (Fig.6). In this month sugar factories season commensets hence prices of bullock rises. Similar results were reported by Bankhele (1991). In September (Rs.5383) during 1999-2000 and in December (Rs.5806) during 2001-02. The prices of bullock were highest, However, Agarwal *et al.* (1989) reported ~~higher~~ highest price in the month of December.

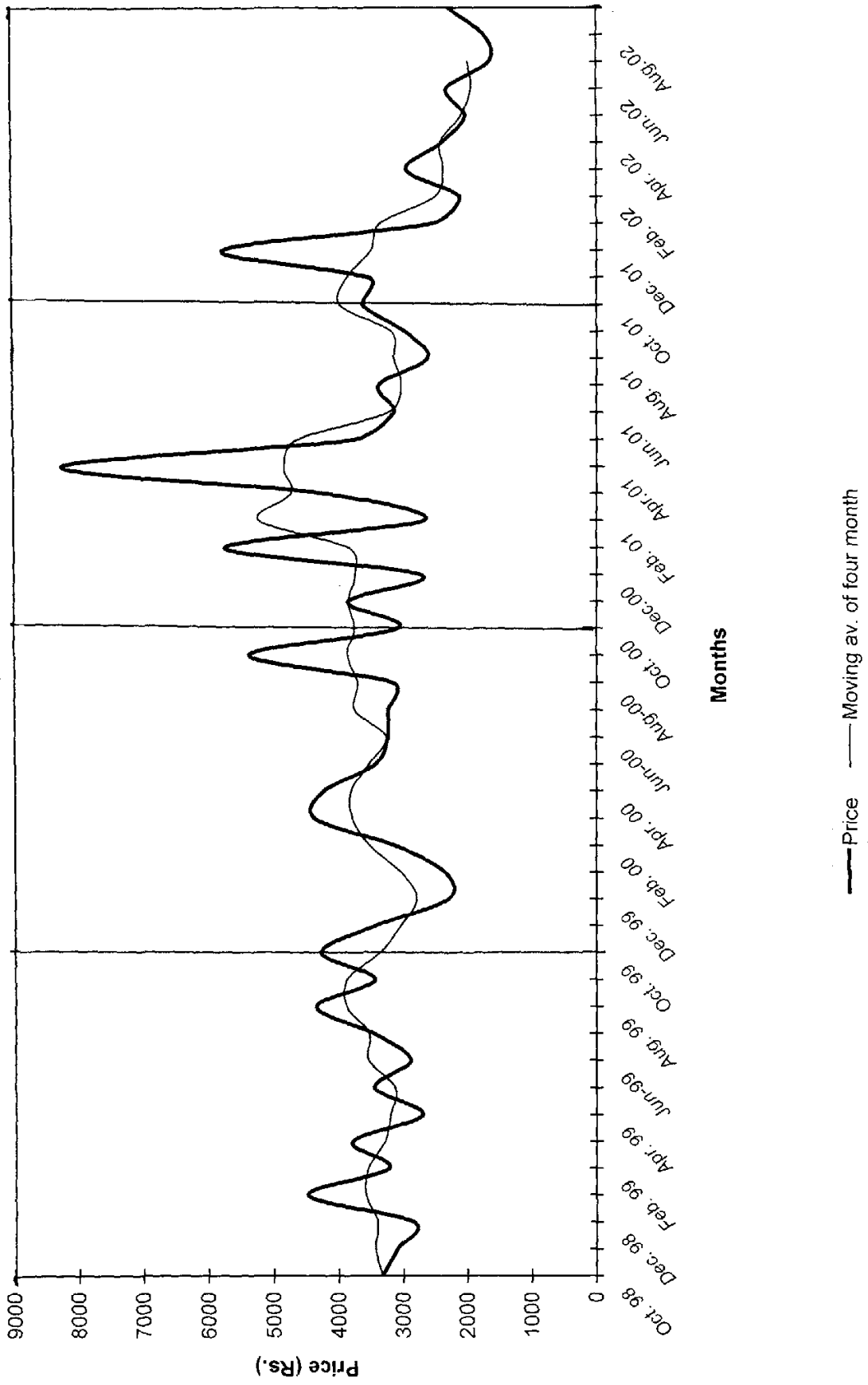
ii) Seasonwise trend of price

During the investigation period irrespective of year highest average price was observed in winter season Rs.3562 \pm 261.23 followed by summer Rs.3548 \pm 348.19 and rainy season Rs.3079 \pm 416.25 (Tab-4). No specific trend was reported in respect of bullocks. This may be because of year round demand of bullocks in Ghodegaon area.

Table 8. Monthwise trend in Price bullocks and four monthly moving averages.

Month	Price	Moving av. of four month	Month	Price	Moving av. of four month
Oct. 98	3329	-	Oct. 00	3078	3760
Nov. 98	3094	3434	Nov. 00	3856	3854
Dec. 98	2838	3406	Dec.00	2724	3751
Jan. 99	4475	3580	Jan. 01	5758	3843
Feb. 99	3219	3546	Feb. 01	2668	5232
Mar. 99	3788	3288	May 01	4224	4737
Apr. 99	2701	3204	April 01	8279	4857
May 99	3443	3123	May 01	3778	4646
June 99	2884	3536	June 01	3148	3232
July 99	3465	3534	July 01	3380	3030
Aug. 99	4354	3881	Aug. 01	2623	3150
Sept. 99	3435	3867	Sept 01	2971	3187
Oct. 99	4270	3352	Oct. 01	3625	3983
Nov. 99	3411	3031	Nov 01	3529	3879
Dec. 99	2294	2794	Dec. 01	5806	3503
Jan 00	2348	3034	Jan 02	2556	3359
Feb. 00	3123	3517	Feb. 02	2123	2507
Mar. 00	4370	3787	Mar. 02	2951	2378
Apr. 00	4229	3815	Apr. 02	2399	2428
May 00	3425	3530	May 02	2042	2105
June 00	3237	3262	June 02	2322	1940
July 00	3231	3752	July 02	1659	2001
Aug 00	3157	3712	Aug 02	1736	-
Sept. 00	5383	3868	Sep.02	2288	-

Fig - 6 Trend in price of bullocks



The highest price was reported in rainy season during (1998-99) similar results were revealed by Arora and Pandey (1995), Anonymous (1956) and Shanmugum and Balakrishnan (1994). During the year 1999-2000 (Rs.3785) and 2000-01 (Rs.4737) in summer season and in 2001-02 (Rs.3879) in winter season the prices of bullocks were highest. Sale (1973), Raut *et al.* (1995) and Verma *et al.* (1989) reported higher price during winter season.

4.2 Factors affecting price of cattle

In view of vast genetic diversity prevailing among animals, it is quite difficult to record information on independent variable (factor) influencing price of animal in the market. Individuality is one of the important factor which influences price of animal in addition to other important factors viz., breed, age etc. The market classes and grades for livestock were not appropriately defined.

In spite of the fact, efforts were made to estimate the effect of several independent variables on price of cattle in market.

4.2.1 Cow including young stock

1. Breed

The results revealed that breed significantly ($P < 0.05$) influences the price of cows including young stock in Ghodegaon market (Tab-9) the variations in the price of cows due to breed was accounted to extent of 49.9% variation. These results were in agreement with those reported by Rajan and Dhaka (2001) in Coimbatore,, Pujari (1997) in Krishna valley,, Rajendran and Prabhakaran (1993) in Dharampuri,

Kareemulla and Srinivasan (1992) in Chittoor,, Makhijani (1961), Raut and Singh (1974), Anonymous (1956) ,in Haryana Mondal and Pandey (1995) and Agarwal *et al.* (1989) .It was appearnt from results that on an average crossbred cow fetched highest price as compared to local /indigenous cows. Amongst crossbreeds HF crossbreeds fetched highest price in the market. These results indicates that the farmer should go for rearing animals of specific breeds for specific purpose which will enable him to get maximum price for animal at the time of selling it. Ultimately this will lead for sustained and economic rearing of cows..

2. Coat colour

In the present investigation it was observed that price of cow was not significantly ($P < 0.05$) affected by coat colour of cow in Ghodegaon market. However, contrasting results were reported by Gillespie (2001) in USA, in India Kaushish (2001), Makhijani (1961), Raut and Singh (1974), Pujari (1997) and Anonymous (1956).

3. Age

Age explained 9.62 % variation in price. It had significant ($P < 0.05$) effect on price. Similar results were putforth by Kaushish (2001), Makhijani (1961), Kareemulla and Srinivasan (1992), , Raut and Singh (1974), Pujari (1997), Mondal and Pandey (1995), Agarwal *et al.* (1989), Shanmugam and Balakrishnan (1994) in India, Gillespie(2001) in USA, and Agymemang (1998) in Gambia.

4. Category

It had significant ($P < 0.05$) effect on price. It had explained 14.6% variation to price of animal. Kaushish (2001), Sastri (1995), in Harayana Mondal and Pandey (1995), Agarwal *et al.* (1989), in karnataka Rathod *et al.* (1978), Pujari (1997) in Krishna Valley, Shanmugam and Balakrishnan (1994) in Coimbatore and Knootz (1992) in USA revealed similar results.

5. Combined effect / interaction of all factors -

Following regression equation was obtained when price regressed over breed, coat colour, age and category (Table 9).

$$Y = -6264.88 + 1925.935 X_1 + 1609.943 X_2 + 1280.445 X_3 + 83.8572 X_4$$

Table 9. Regression analysis of factors affecting price of cow including young stock

Variable	R ²	b	S.E.
Breed	0.4994	1925.935*	77.843
Coat colour	0.4256	1609.943	875.622
Age	0.0962	1280.445*	126.742
Category	0.146	833.857*	72.452

$$a = -6264.88 \quad R^2 = 0.74144 \quad \text{*significant, } P < 0.05$$

The breed, coat colour, age and category were explained for 74.14% variation in price of cow. Breed, age and category had significant

($P < 0.05$) effect on price of cow . However coat colour didn't show any significant effect on price.

While purchasing cow from market one should consider breed, age and category. It was further observed that breed was important factor to be considered while selling or purchasing cow than age and category.

4.2 Cows excluding young stock

1. Breed

It had explained 68.71% variation in price. It has significant ($P < 0.05$) effect on price of cow. Rajan and Dhaka (2001) in coimbatore market of cattle, in Krishna valley market Pujari (1997), Rajendran and Prabhakaran (1993) Dharmपुरi market, Kareemulla and Srinivasan (1992) in Chit toor, Agarwal *et al.* (1989) in Rajasthan, Mondal and Pandey (1995) in Haryana Anonymous (1956), Makhijani (1961) and Raut and Singh (1974) in India.

2. coat colour

It ~~does~~ didn't shown any significant ($P < 0.05$) effect on price of cow. However, in USA Gillespie (2001) and in India Kaushish (2001), Raut and Singh (1974), Pujari (1997) and Anonymous (1956) reported contrasting results they reported significant effect of coat colour on the price of cows in different markets.

3. Age

It had significant ($P < 0.05$) effect on price of cow and explained about 0.27% to variation in price. Kareemulla and Srinivasan (1992) in Chitoor, Makhijani (1961), Kaushish (2001), Raut and Singh

(1974), Pujari (1997) in Krishnavalley, in Harayana, Mondal and Pandey (1995) and Agarwal *et al.* (1989), in Coimbatore cattle market Shanmugam and Balakrishnan (1994), Gillespie (2001) in USA, and Agymemang (1998) in Gambia.

4. Category

It also had significant ($P < 0.05$) effect on price and explained 5.72% to variation in price. The results were in agreement with Mondal and Pandey (1995), Agarwal *et al.* (1989) in Harayana, Rathod *et al.* (1978) in karnataka, Kaushish (2001), Pujari (1997) in Krishna valley, Shanmugam and Balakrishnan (1994) in Coimbatore, Sastri (1995) in India, Knootz (1992) in USA.

5. Interaction effect of all factors

The regression equation obtained when price regressed on all other factors is given below.

$$Y = -5338.725 + 2204.595 X_1 - 822.726 X_2 + 861.6594 X_3 + 656.7316 X_4$$

Table 10 Regression analysis of factors affecting prices of cows (excluding young stock)

Variable	R ²	b	S.E.
Breed	0.6871	2204.595*	81.3313
Coat colour	0.1567	-822.726	588.58
Age	0.0027	861.6594*	233.3806
Category	0.0572	656.7316*	102.4203

a = -5338.725

R² = 0.747

*significant, $P < 0.05$

It was observed that breed, age and category had significant effect on price and explained 74.7% variation in price of cow (Tab-10).

Irrespective age group HF cross breed cows fetched maximum price Rs.9850 followed by Jersey cross breed Rs.8475, Khillar Rs.3625 and local cows Rs. 1850 (Tab-11), (Fig.7).It was observed that in all breeds highest price was received during 3-7 years of age of cows.

In the above analysis age and category contributed less to variation of price because age group was more uniform and comparatively less variation in price was reported.

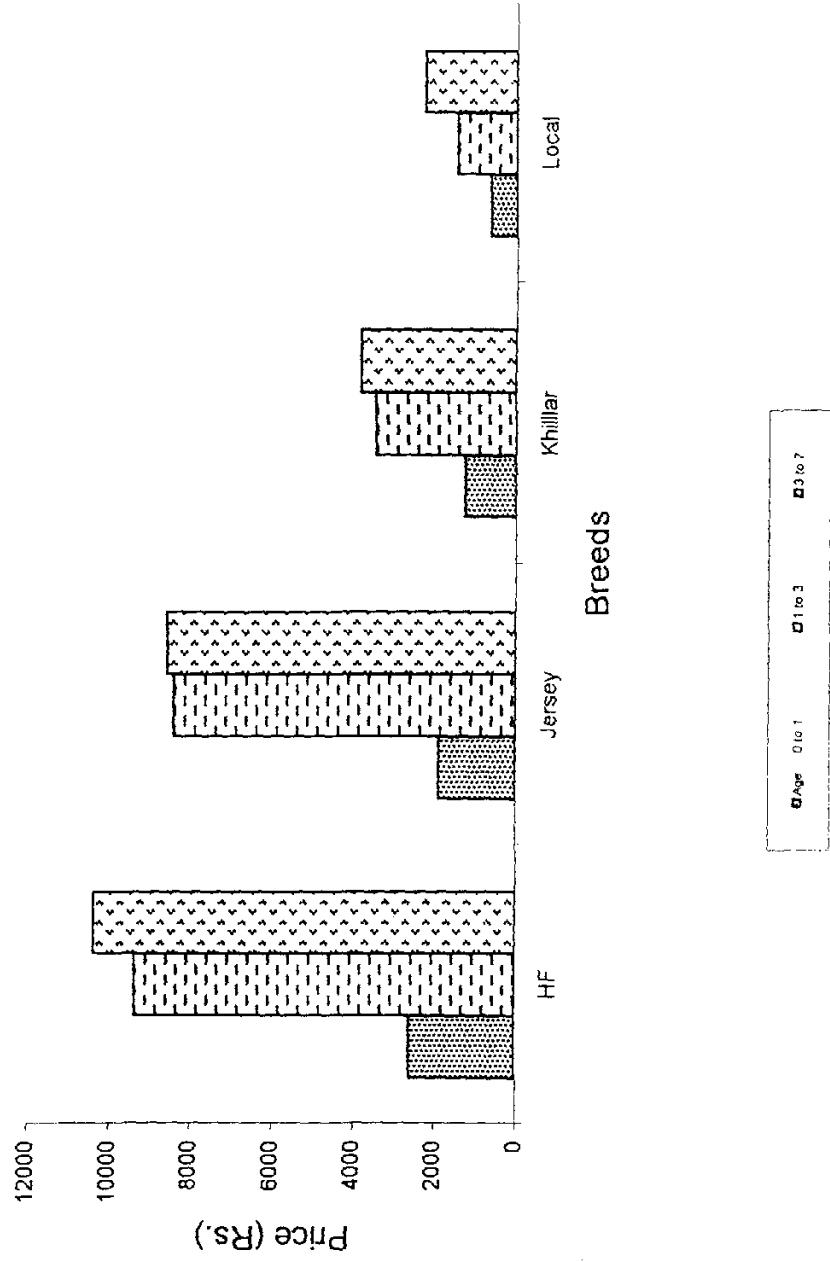
One should not ignore breed, age and category of cow while selling or buying of cows.

Tab-11 Age groupwise average price observed for different breeds of cows

Breed	Age group			Average price of cows	
	0-1 (yr)	1-3 (yr)	3-7 (yr)	including youngstock	excluding youngstock
HFcross	2600 (18)	9350 (47)	10350 (53)	7433	9850
Jersey cross	1900 (10)	8400 (34)	8550 (38)	6283	8475
Khillar	1250 (13)	3450 (21)	3800 (15)	2833	3625
Local	640 (12)	1450 (16)	2250 (23)	1447	1850

Figures in parenthesis indicates the no. of samples taken randomly.

Fig. 7 Age groupwise av. price observed for different breeds of cows



4.2.3 Bullocks

1. Breed

Breed had significant ($P < 0.05$) effect on price. It had explained 44.22% variation in bullock price (Tab-12). Further it was observed that local bullock fetched higher price than crossbred bullock and khillar breed fetched highest price return. Significant effect of breed on bullock price reported by Rathod *et al.* (1978), Bankhele (1991), Patil *et al.* (2001), Kreemulla and Srinivasan (1992), Rajendran and Prabhakaran (1993), Pandey (1995), Shanmugam and Balakrishanan(1994), Mishra and Nayak (1991) and Sale (1973) in Karnataka, in Belhe market ,in M.S.,in A.P. in Haryana,Coimbatore and Pune,respectively.

2. Coat colour

Coat colour of bullock had significant ($P < 0.05$) effect on price, explained 17.66% variation of bullock price (Tab-12). Bankhele (1991) in Belhe market, Sale (1973) in Pune and Patil *et al.* (2001) in M.S. reported similar results. These results were in agreement with Mishra and Nayak(1991), Rathod *et al.*(1978)in Karnataka and Arora and Pandey (1984) in Harayana.

3. Age

Age of bullock had significant ($P < 0.05$) effect on price of bullock. It was observed that age was responsible to cause 50.84% variation in bullock price (Tab-12). Similar results were revealed by Anonymous(1956), Kareemulla and Srinivasan (1992) in AP, Rathod *et al.* (1978) inKarnataka, Shanmugam and Balakrishanan(1994) in Coimbatore,

Mishra and Nayak (1991) in Bhubaneshwar, Patil *et al.* (2001) in MS and Arora and Pandey (1992) in Haryana.

4. Interaction effect of all variables

When price was regressed over breed, coat colour and age following equation was obtained.

$$Y = -4584.679 + 2214.557 X_1 - 1018.87 X_2 + 3276.21 X_3$$

Table 12 Regression analysis of factor affecting bullock price

Variable	R ²	b	S.E.
Breed	0.4422	2214.557*	252.993
C.C.	0.1766	-1018.872*	265.3079
Age	0.5084	3276.214*	138.938

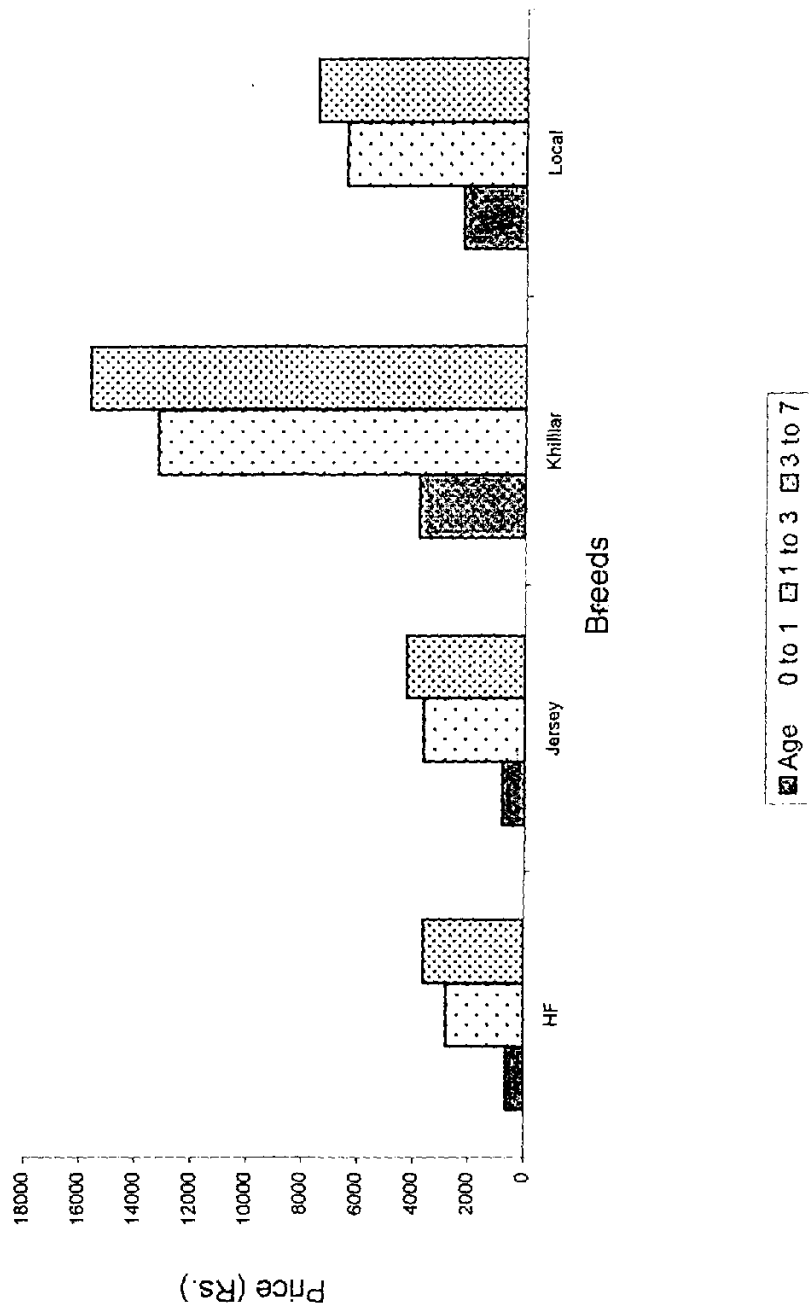
$$a = -4584.679 \quad R^2 = 0.774 \quad \text{*significant, } P < 0.05$$

All factors significantly affected price of bullock. It was further observed that they had explained 77.4% variation in price of bullock (Tab-12) in Ghodegaon market.

It is revealed that while purchasing bullock one should not ignore age, breed and coat colour of bullock. Similar factors should be considered for deciding price of bullock to sell.

In all age groups Khillar bullocks fetched maximum price in Ghodegaon market followed local, jersey and HF cross breed bullocks as

Fig. 8 Age groupwise average price observed for different breeds of bullocks



Rs. 10200, 5400, 2903 and 2350, respectively. (Tab-13), (fig-8). The bullock fetched highest price in between 3-7 years of age.

Tab-13 Age groupwise average price observed for different breeds of bullocks

Breed	Age group			Average price
	0-1 (yr)	1-3 (yr)	3-7 (yr)	
HFcross	650 (15)	2800 (12)	3600 (19)	2350
Jersey cross	810 (14)	3650 (14)	4250 (21)	2903
Khillar	4800 (19)	11200 (23)	14600 (28)	10200
Local	2250 (14)	6450 (33)	7500 (38)	5400

Figures in parenthesis indicates the no. of samples taken randomly.

4.3 Marketing systems of cattle

Following were the marketing systems observed during investigation .

4.3.1 Farmer / producer - farmer / consumer

This channel was followed in only 8% transactions (Tab-14), (Fig-9). This may be because of most peoples were not acquainted with market situation and didn't know how to deal with sellers / buyer.

Table 14. Marketing channels in Ghodegaon cattle market

Sr. No.	Marketing channel	No. of transactions taking place	(%)
a	Farmer - farmer	044	08
b	Farmer - mm- farmer	231	42
c	Farmer - trader - farmer	110	20
d	Farmer - mm- trader - mm - farmer	077	14
e	Farmer - trader -wt - farmer	088	16
	Total	550	100

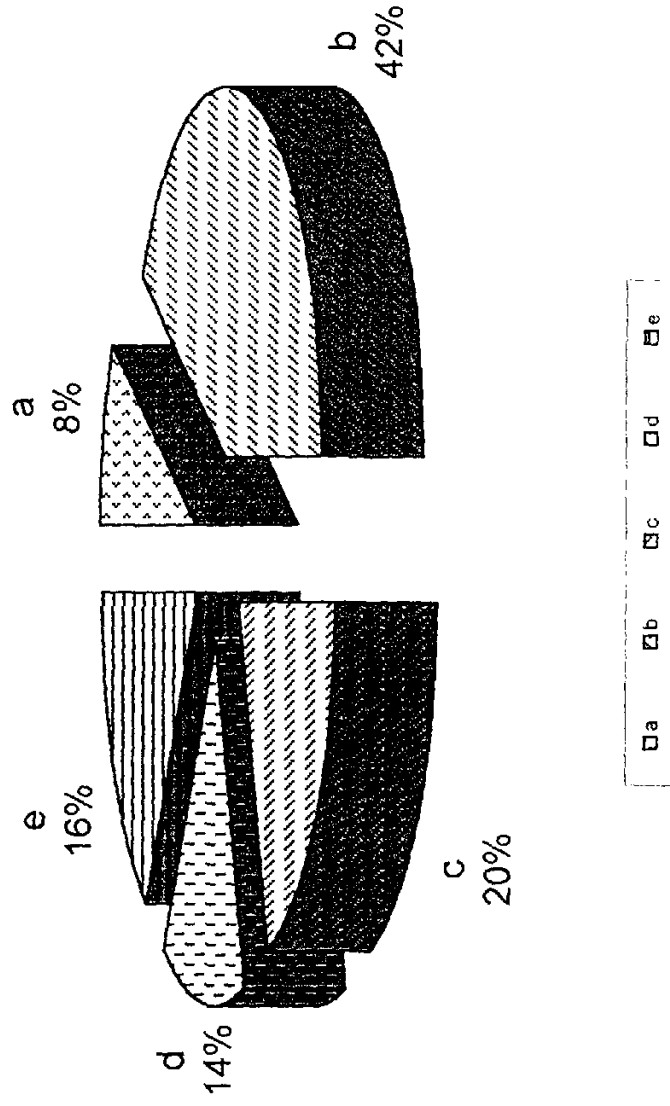
Similar marketing channel was reported by Kareemulla and Srinivasan (1992) in Chitoor (AP), Rajan and Dhaka (2001), Coimbatore (TN), Kaushish (2001), Singh and Patel (1981) in Haryana state in case of buffalo, Sharma *et al.* (2001), Sastri (1995) and Singh (1988) in Haryana state.

In this channel producer's share in buyers price was highest because no middlemen were involved.

4.3.2. Farmer / producer - middlemen - farmer / consumer

Most transactions in market were following Farmer/producer - middlemen - farmer / consumer channel. It was observed that 42 % farmers followed this way of transaction (Tab-14), (Fig-9). As compared to other channel less intermediaries were involved (one / two) hence comparatively higher return to sellers and buyers has to pay optimum price.

Fig. 9 Marketing channels in Ghodegaon cattle market



Sharma *et al.* (2001), Sastri (1995), Pujari (1997), Bankhele (1991), Singh and Patel (1981), Gillespie (2001), Bruyn *et al.* (2001), Liager *et al.* (2000), reported similar marketing channel in Himachal Pradesh, Krishna valley, Pune, USA

4.3.3 Farmer / producer - trader - farmer/consumer

Animal reaches to buyer only through trader in this channel. The trader may be village trader or wholesale trader. This channel was reported in 20% transactions (Tab-14),(Fig-9). It was second major channel observed in the cattle marketing. The traders generally used to purchase animal at one market and sell in another market by drawing their own margins.

This marketing channel was reported by Singh (1988), Kaushish (2001) in India, Rajan and Dhaka (2001) in Coimbatore, Kareemulla and Srinivasan (1994) in Chittoor cattle market and Singh and Patel (1981) reported similar marketing channel in case of buffaloes in Haryana.

In this channel no dalal / middlemen was present hence producers share was founded higher than other channels except producer - buyer channel.

4.3.4 Farmer / producer - middlemen - trader - middlemen - farmer / consumer

This channel had contributed 14% of total transactions taking place in Ghodegaon market (Tab-14), (Fig-9). Middlemen are many times found bind together with traders. Higher margins are drawn by middlemen

as well as trader. One or two middlemen may be present in this system of marketing.

Sastri (1995), Rajan and Dhaka (2001) Kaushish (2001) and Bankhele (1991) reported farmer/producer-middlemen-trader-middlemen-farmer/consumer channel. Talukdar and Singh (1995), Gillespie (2001), Bruyn *et al.* (2001) and Liager *et al.* (2000) reported similar marketing channel in case of beef animals.

Because of highest involvement of middlemen in this channel it was found as costliest channel. Togetherly middlemen offers lower bids and seller could not get optimum price of their animal.

4.3.5 Farmer/producer-trader-wholesale trader-farmer/consumer

This marketing channel was observed as third major channel and contributed 16 per cent of total transaction taking place in the market (Table 14), (Fig. 9).

Similar marketing channel was revealed at Coimbatore market by Kareemulla and Srinivasan (1994), Rajan and Dhaka (2001) and in Haryana by Singh and Patel (1981) and Singh (1988).

In this channel the animal was sold more than one time and hence no direct contact or transaction in between producer and buyer. Higher margins were drawn during each transaction.

4.4 Constraints in cattle marketing

4.4.1 Inadequate infrastructural facilities

Lack of shed, loading and unloading platform, scanty parking facility, ill drainage, inadequate space were the main problems faced by cattle sellers and buyers at market. Out of 550 samples investigated 86% of them responded for explaining their constraint.(Tab-15) Similar results

Table 15. Constraints faced by buyer and Sellers in Ghodegaon cattle market.

Sr. No.	Constraint	n	%
1	Inadequate infrastructure	473	86
2	Exploitation by Middlemen	451	82
3	Expenses on preparation for sale	374	68
4	Non availability of feed and water	341	62
5	Malpractice	247	54
6	Less credibility of animals	264	48
7	Improper functioning of market	424	44
8	Higher marketing expenditure	231	42
9	Improper pricing of animal	209	38
10	Inadequate Market information	198	36
11	Higher transportation cost	176	32
12	High investment in purchasing of animal	154	28
Total no of Respondents		550	-

n = No. of observation

were revealed by Pujari (1997), Shah (2001), Gaikwad (1985) and Sharma (2001) in Krishna valley, Kolkatta and Himachal Pradesh Market, respectively.

4.4.2 Exploitation of Middlemen

Number of middlemen, higher brokerage, higher and flexible commission undercover or hatta method of transaction followed by middlemen were the main constraints faced by 82 per cent. Almost similar constraints were reported by Shah (2001), Khan and Rao (1998), Mulla (1997), Kareemulla and Srinivasan (1994), Talukdar and Singh (1995), Singh (1988), Raut *et al.* (1995), Kaushish (2001), Pujari (1997), Kareemulla and Srinivasan (1992), Bankhele (1991), Arora and Pandey (1992), Little *et al.* (1995), Gopalrao and Iqbaluddin (1988) and Anderson (1998) in Dhule, Haryana, South Somalia, Karnataka, Haryana, Krishna valley, Pune, Gambia, Kolkatta, Belgium, Haveri, A. P. and Meghalaya markets, respectively.

4.4.3 Expenses on preparation of animals for sale

Preparing animal for marketing was constraint for 68 per cent farmers. Pujari (1991) in Krishna valley and Khan (1998) in India revealed similar constraints.

4.4.4 Non availability of feed and water

About 61 per cent cattle sellers and buyers in Ghodegaon cattle market expressed poor quality water supply, less water availability, costlier feeds and forages, and the load shading of power supply during market hours are the constraints. These results were in agreement with Sharma *et al.*

(2001) in Himachal Pradesh, Pujari (1997) in Krishna valley, Kareemulla and Srinivasan (1994) in A.P. and Gaikwad (1985) in M.S.

4.4.5 Malpractices

In order to obtain higher prices for animals sellers and traders adopted several malpractices. in Ghodegaon cattle market which caused inconvenience to 54 % farmers or buyers (Table 15). In case of the cows partial milking or non milking for few days prior to marketing to pose the cows as high milk yielder. Many times older calf were replaced by younger one to give false information of lactation. The herbal medicine were administrated to the animals which enhances the thirst. Therefore, animal drinks more water and gives an appearance of healthy animal. Decorticating horns (finishing) to hide the age. Feeding jaggery to increase temperory milk production were some of the malpractices adopted by sellers and traders. Sindhu (1960), Joshi (1950), Arora and Pandey (1984), Sastri (1995), Sharma *et al.* (2000) also reported. Similar type of malpractices adopted while selling cattle in market.

4.4.6 Less credibility about productive status of animal

About 47 per cent farmers opinioned that, health and productive status of animal were not correctly putforth by sellers in the market (Table 15). Most of the farmer rearing cattle did not maintain record of animals performance. Therefore, reliable information on growth and production performances were not available with farmers. The middlemen involved in the process of transaction further tried to exploit the situation. Almost similar constraints were reported by Kaus *et al.* (1997) in



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Australia, in Belgium. Schroder *et al.* (1998), Viane *et al.* (1998) and Sindhu (1960) in Punjab.

4.4.7 Improper functioning of cattle market

Market committee does not provide attention to the complaints of the sellers and many times involved in unworthy operations with dalal's. This constraint was experienced by 45% farmers (Table 15). Pujari (1997), Kretter (1998) and Haan *et al.* (1999) also observed almost similar results in Krishna valley, USA and South Africa markets, respectively.

4.4.8 Higher marketing expenditure

Expenditure for marketing of cattle was the constraint faced by 42% sellers (Table 15). These results were almost in agreement with those reported by Anderson (1998), Pujari (1997) and Khan (1998) in USA, Krishna Valley and Karnataka markets, respectively.

4.4.9 Improper pricing of animals

Table No. 15 revealed that 39 % farmers were of the opinion that animals brought in market did not receive appropriate price. This might be probably due to the involvement of several middle men and their vested interests. Agyemang *et al.* (1998) in Gambia and Kareemulla and Srinivasan (1992)ⁱⁿ Chitoor reported similar constraint

4.4.10 Inadequate market information

Non availability of reliable and timely market information were the major problems faced by 36 % farmers (Table 15). It doesn't suggest that others get timely market information, but it suggests unawareness of farmers attach to give importance to it. Jack *et al.* (2000)

Anderson (1998), Pujari (1997), Kaushish (2001) and Sharma *et al.* (2001) also reported almost similar problems in UK, USA and India, respectively.

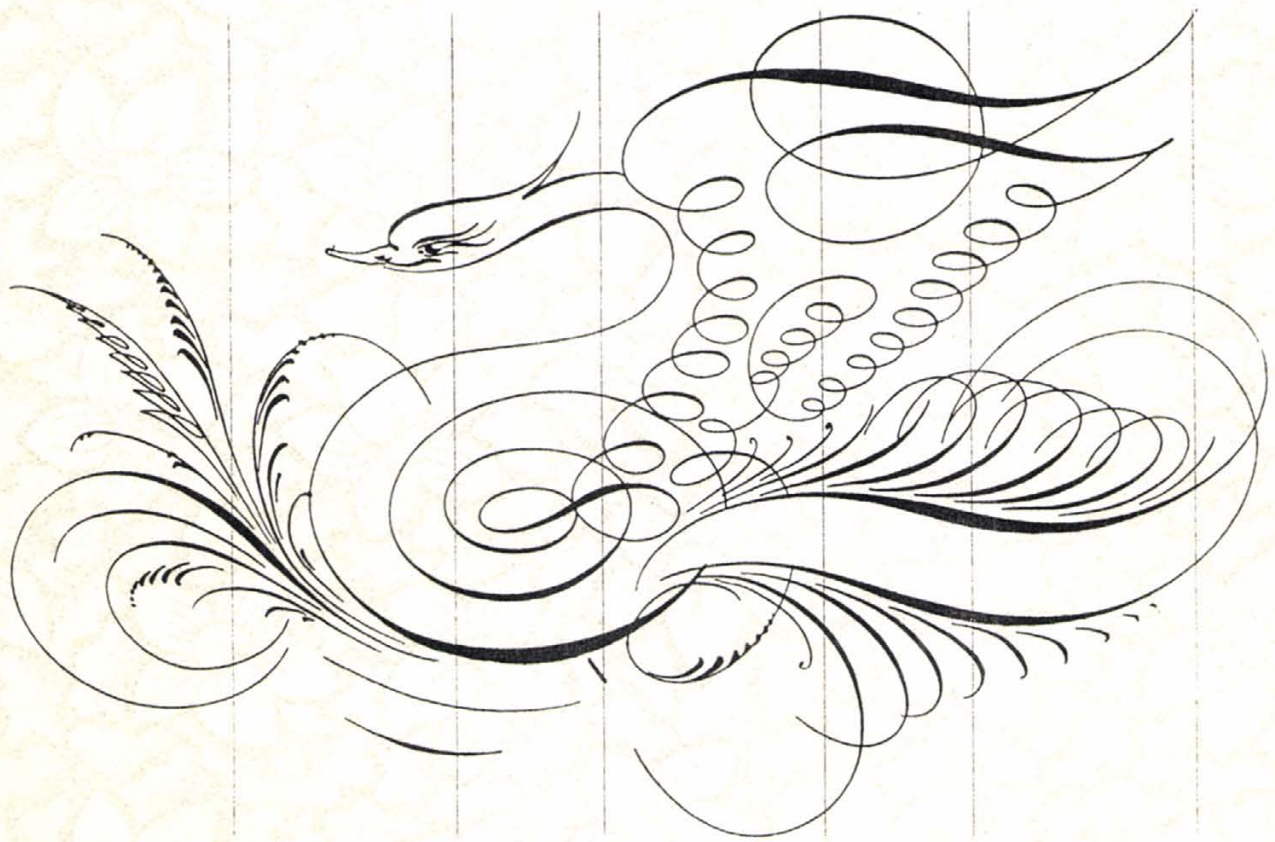
4.4.11 Higher transport expences

The monopoly of tempo/truck owners resulted in to increase in transport cost of animal. This was faced by 32 % sellers and buyers. Anonymous (1956), Khan and Rao (1998), Sharma *et al.* (2001), reported similar constraints in Belgaum and Himachal Pradesh.

4.4.12 Investment in purchasing animal

Table 15 revealed that 28 % farmers found high investment in purchasing animals non assessable bank loans and high rate of interest as constraint. Almost similar results were reported by Sharma *et al.* (2001) in Himachal Pradesh, Rajendra and Prabakaran (1993) in the Dharampuri, Kolajo and Martin (1994) ⁱⁿ USA and Viaene *et al.* (1998) ⁱⁿ Belgium market.

SUMMARY AND
CONCLUSIONS



5. SUMMARY AND CONCLUSION

5.1 Summary

The present investigation entitled, "Marketing systems of cattle in Ghodegaon market of Maharashtra" was undertaken to guide farmers when to buy or sell his animals to get optimum returns from it.

Two types of data were collected. Primary data were collected by surveying 350 cow owners and buyer and 250 bullock owners and buyers. While secondary data were collected from APMC, Ghodegaon from October 1998 to 2002 September.

The data were analyzed to study

1. Trends in cattle marketing
2. Factors affecting price of cattle
3. Marketing systems of cattle
4. Constraints in cattle marketing

To study trend in cattle marketing data were analyzed by time series moving average method and multiple regression was used to study factors affecting cattle price.

Mostly, the arrival of cows were observed in June and July months during rainy season and that of bullocks in October during winter season. No specific monthly trend was observed in disposal of cows and bullocks but the seasonal disposal were highest in winter and summer season, respectively. The highest price of cows and bullocks were mostly

recorded during January. However, seasonal trends showed that highest prices were fetched during winter and summer in the case of cows and bullocks, respectively.

Irrespective of year overall average arrival, disposal and price were observed as 1542 ± 154.10 , 511 ± 105.47 , 5314 ± 809.78 and 2003 ± 275.25 , 497 ± 67.14 , 3397 ± 274.19 for cows and bullocks, respectively.

Breed, age and category were found significantly ($P < 0.05$) affecting price of cow but coat colour of cow didn't show any significant effect on price. Above three factors explained 74.14% variation in a group, including calves, but inclusive of calves it explained 74.7% variation in the price. However, in the case of bullocks breed, age and coat colour showed significant ($P < 0.05$) effect on price. They combinedly explained 77.40% variation in the price of bullocks.

In the case of marketing channels five ~~distinct~~ marketing channels were observed. It was also recorded that 72% transaction took place in the presence of broker / middlemen. Farmer - mm - farmer and farmer - trader - farmer were the channels mostly preferred for transaction in this market. They had contributed 42 and 20% of total transactions, resp.

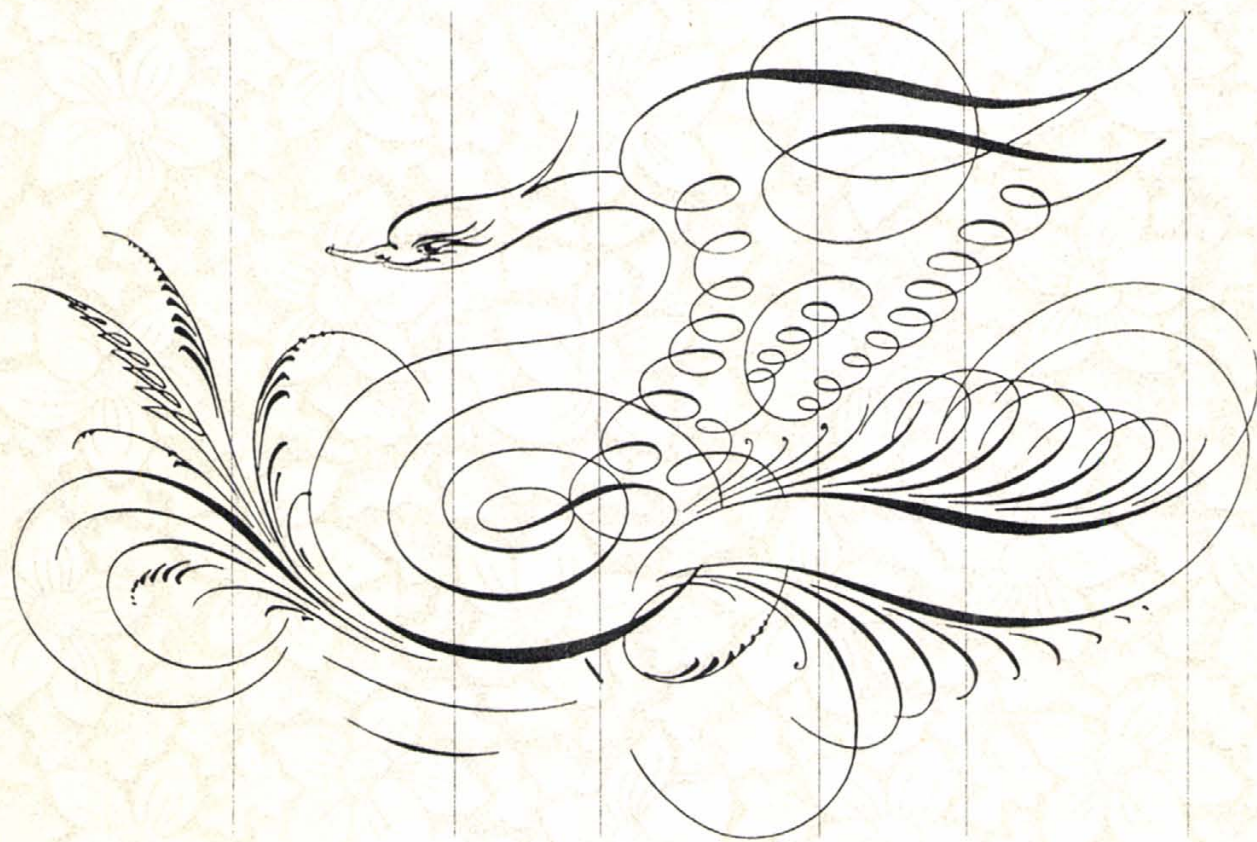
Most of the farmers (sellers as well as buyers) reported inadequate infrastructure facilities (86%) and participation of middlemen (82%) as major constraints in cattle marketing.

5.2 Conclusion

In the light of the empirical evidences brought out by the study following set conclusion are drawn.

1. The cows and bullocks be sold during the month of January in Ghodegaon market for fetching higher price. The arrival and disposal did not affect cattle price.
2. The breed and age significantly contributed to the price of cows and bullocks however, variation in the price of cows and bullocks were attributed to the category of animal and coat colour, respectively.
3. Farmer - mm - farmer and farmer - trader - farmer were the most preferred marketing channels in Ghodegaon market.
4. Inadequate infrastructure facilities and interference of middlemen were the major constraints in cattle marketing.

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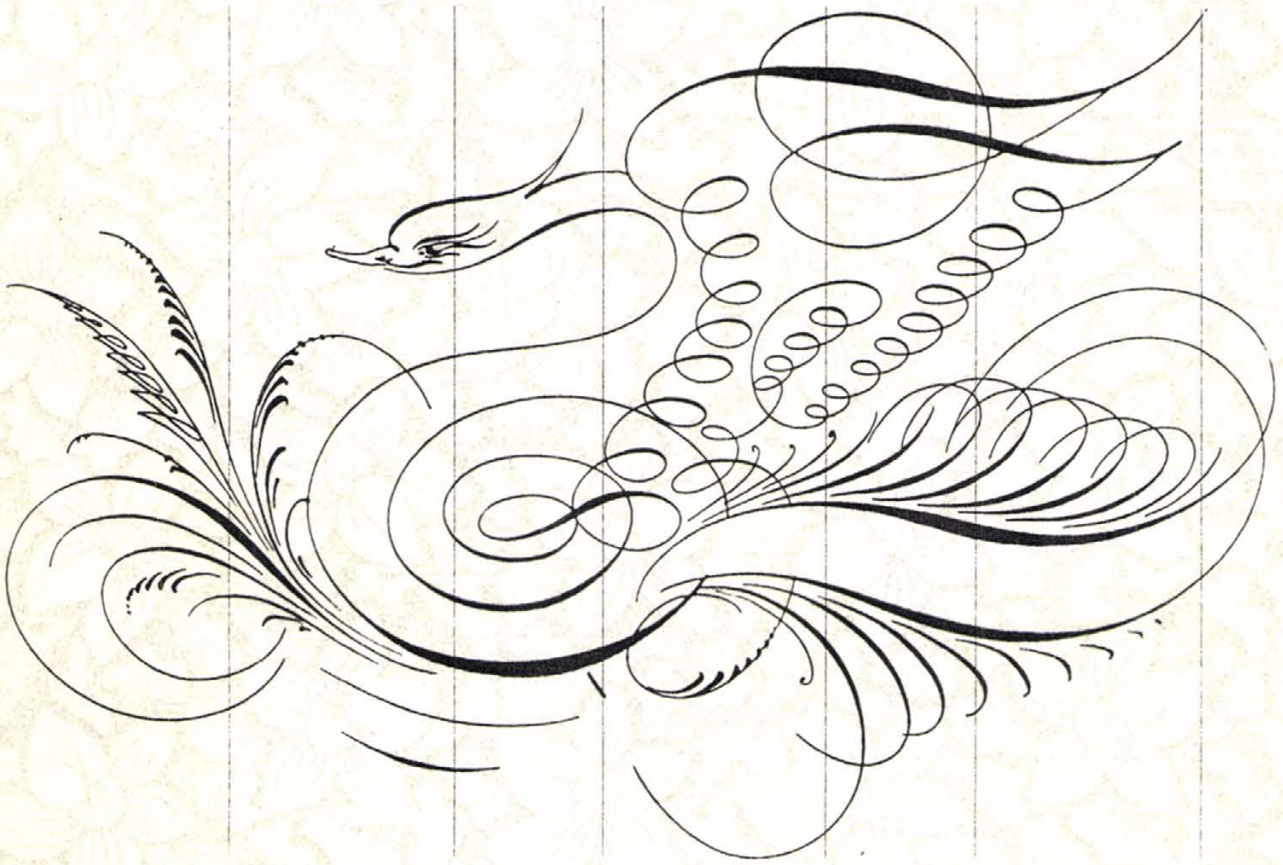
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APPENDICES



7. APPENDIX

Appendix - I

Questionnaire for the seller of cattle

Name : _____ **Date :** _____

Village : _____ **Tal.** _____ **Dist.** _____

Education : _____ **Dist. from Market :** _____ **km**

Name of Market : Ghodegaon

1. How many times you bring the cattle in the market ? : 1, 2, 3, 4

2. Occupation : farmer/ Trader/ Agent

3. Causes for selling

I. Financial problem II. Fodder problem (Green/dry)

III. Excess animal IV. Defective animal

v. Illi animal VI. Replacing animal

4. Expenses incurred on selling of animal

i. Preparation for sale : Rs.

ii. Feeding cost : Rs.

iii. Transporting cost : Rs.

iv. Entrance Fees : Rs.

v. Dalali : Rs.

vi. Miscellaneous cost : Rs.

5. Method of bringing animal to market ? By bullock cart/self/truck/other

6. Price of sold animal Rs.



Appendix - II

Questionnaire for buyer of animal

Name : _____ **Date :** _____

Village : _____ **Tal.** _____ **Dist.** _____

Education : _____ **Dist. :** _____ **km** _____

Name of Market : Ghodegaon

1. How many times you purchase cattle ? 1, 2, 3, 4, ____

2. Occupation : farmer/trader

3. Reason for buying :

1. Need of animal 2. For resale 3. Other

4. Expenses incurred on buying of animal

i. Price of animal : Rs. ii. Dalali : Rs.

iii. Miscellenious : Rs.

5. Discription of animal purchased

i. Cow / heifer / bull / bullock ii. Breed-crossbreed/local

iii. Age Yrs. iv. Coat colour :

v. No. of incisors : 2, 4, 6, 8 vi. If cow, lactation order =

6. Method of buying animal- self / middlemen / friend / relative

7. Is there any need of intermadians in transaction - Yes / No.

i. To search seller iii. To give guaratee of animal

ii. To fix price iv. other

8. Did you get guarantee of animal - Yes/No

9. Problems faced during marketing of animal

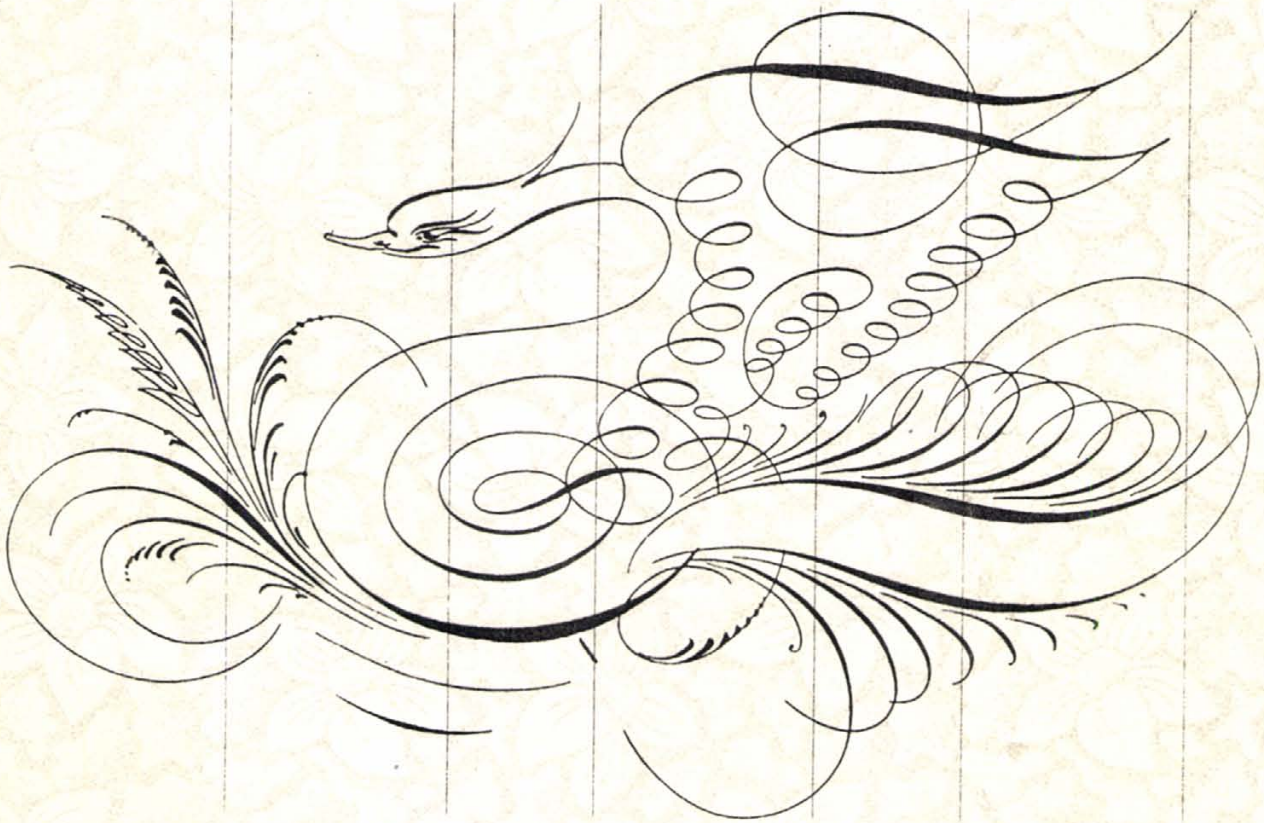
10. Suggestions to improve marketing systems

Appendix - III**Marketing systems of cattle in Ghodegaon Market of Maharashtra**

1. Format for secondary data

Sr.No.	Month	Arrivals (No.)	Disposal (No.)	Total price of disposed animals
1	October			
2	November			
3	December			
4	January			
5	February			
6	March			
7	April			
8	May			
9	June			
10	July			
11	August			
12	September			

VITA



8. V I T A

MAHESH SAMPATRAO WAMAN

A candidate for the degree
of

Master of Science (Agriculture)

Title of Thesis : "Marketing system of cattle in Ghodegaon Market of Maharashtra".

Major field : Animal science

Biographical information

Personal : Son of Shri Sampatrao Karbhari Waman and Sau. Leela Sampatrao Waman. Born at Jawale Kadlag. Tal. Sangamner, Dist. Ahmednagar on 25th May, 1980 and have a younger brother Mangesh.

Educational qualification :

Obtained primary education at Z.P. School, Rajapur and Secondary School education from Nutan Madhyamik Vidyalaya, Rajapur. Passed S.S.C. examination with 81.14 per cent (First class with distinction) in 1995.

Completed higher secondary education from Dnyanamata Junior College and B.G.P. Sahyadri Junior College. Passed H.S.C. with 75.50 per cent (First class with distinction) in 1997.

Obtained B.Sc. (Agriculture) degree from College of Agriculture, Pune in 2001 with 83.37 per cent (first class).

Extra curricular activities

1) Participations

- ❖ Participated in N.S.S. (240 hrs and two special camps)
- ❖ Participated in National Integration and Pre Republic day, Pared camp held at Porbandar (Gujarat state) during 1998-99.

2) Achievements

- ❖ Achieved N.S.S. Best Volunteer Award in 1999-2000
 - ❖ Achieved College Merit Cum Means Scholarship in 1998-99 and 1999-2000.
 - ❖ Achieved College Merit Scholarship in 1999-2000.
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