RESEARCH ARTICLE

An estimation of demand and supply of dry fodder in Karnataka State

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ABSTRACT

In the present study an attempt was made to analyze the changes in demand and supply of dry fodder crops in Karnataka state. For projection of demand and supply of dry fodder, the annual growth rate of production (supply) of dry fodder for different districts of the state were estimated by using the linear regression model. The study revealed that the Kolar district was the highest in supplying of dry fodder and Kodagu was the lowest in the state. The increasing trend was observed in all the districts. The supply of dry fodder increased on an average of 1.81 per cent per annum. Supply of dry fodder increased to 22324.2 thousand metric tonnes by 2010-11. The highest gap was observed in Dakshin Kannada district and the lowest gap was noticed in Mysore district. The supply of dry fodder has decreased and it has stagnated in many of the districts. This may be due to lack of technological break through in fodder production.

INTRODUCTION

India is house to 15 per cent world cattle population and 16 per cent of human population to be sustained and progressed on 2 per cent of total geographical areas. Due to ever increasing population pressure of human, arable land is mainly used for food and cash crops, thus there is little chance of having good quality arable land available for fodder production, and until milk production is remunerative to the farmer as compared to other crops. This has put tremendous pressure on the availability of dry fodder. Dry fodder cultivation has been traditional in most parts of the country since farmers feel that the fodder crops have some factor, which keeps the animal healthy and productive. Therefore, since generations farmers have marked out certain varieties and crops for dry fodder production and cultivate these, depending on availability of land and water. The dry fodder crops are known to be cheaper source of nutrients as compared to concentrates and hence useful in bringing down the cost of feeding and reduce the need for purchase of feeds/ concentrates from the market.

Although, the milk production is the highest in the country but productivity per cow per year is far below as compared to the developed countries due to inadequate quantity and quality of dry fodder. However, the per capita annual consumption of milk is only 56.2 kg, considering the basic requirement of the country to feed its 100 crores people, the milk production has to be increased substantially. Therefore, maximization of dry fodder production per unit area and time within the existing farming systems and by utilizing marginal, sub-marginal dry lands for developing fodder resources is essential. Owing to simultaneous efforts by genetic upgradation of the livestock as well as fodder resources by several improved cultivation practices like, the introduction of suitable varieties of grasses and legumes and by bringing vast culturable and unculturable wastelands (158 million hectares in India), which is not suitable for crop production.

In Karnataka, animals are mainly fed with crop residues of jowar, maize, bajra, ragi and paddy. A few dairy farmers grow cultivated fodders. Practically, it is not possible to bring forage area under irrigation. The only alternative is to have fodder crops that ensure supply of dry fodder over a long period of time under rainfed situations on marginal and sub-marginal lands. Under these circumstances, it is essential to rejuvenate our lands and enhance production, productivity and economic returns over a long period of time.

In present study, an attempt has therefore, been made to estimate the demand and supply of dry fodder in Karnataka state.

METHODOLOGY

The study was based on the secondary data on availability and requirement of dry fodder for different districts and taluks collected for the period from 1989-90 to 1998-99 from the Animal Husbandry and Veterinary Department, Bangalore.

For projection of demand and supply of dry fodder, the annual growth rate of production (supply) of dry fodder for different districts of the state were estimated by using the following linear regression equation to the time series data on production of dry fodder of the state from 1989-90 to 1998-99.

$Y = a + b_t + u$

where,

Y = Production/requirement of fodder in year 't'

a = Intercept

b = Regression coefficient

t = Time period (t = 1, 2, ………….n)

u = Error term

Based on the estimates of linear growth rates, the production (supply) of dry fodder for different districts of the state was projected for 2002-03 to 2010-11.

The gap between demand and supply of dry fodder was estimated as below as percentage of demand (requirement).

$$\% \, gap = \frac{Demand > Supply}{Demand} \times 100 \qquad (1)$$

The projection of demand, supply and gap were worked out for individual district and for the state as a whole.

RESULTS AND DISCUSSION

The findings of the present study as well as relevant discussion have been summarized under following heads:

Supply estimation of dry fodder:

The simple linear regression coefficient was used to estimate the demand and supply of dry fodder in the state as a whole. This method helps for forecasting or prediction of demand and supply of dry fodder in the state. The results of the simple linear regression coefficient functions for supply of dry fodder in the state as a whole are presented in Table 1.

The intercept and slope coefficients were statistically significant at one per cent in all the districts. The overall

Table 1 : Estimated growth rate of supply for dry fodder in Karnataka					
Districts	Intercept	Coefficient	R^2	F	LGR
Bangalore (U)	2.336 (813.48)	0.00410* (8.862)	0.90	78.53*	0.949*
Bangalore (R)	2.572 (494.22)	0.0176* (21.042)	0.98	442.79*	4.148*
Belgaum	3.104 (1776.91)	0.00535* (19.006)	0.97	361.25*	1.23**
Bellary	3.078 (4702.77)	0.00318* (30.138)	0.99	908.30*	0.734*
Bidar	2.783 (647.53)	-0.00859* (-12.393)	0.95	153.59*	-1.957*
Bijapur	3.148 (1496.24)	0.0158* (46.869)	0.99	2196.73*	3.727*
Chikmagalur	2.534 (1415.96)	0.00867* (30.092)	0.99	905.53*	2.018*
Chitradurga	3.122 (1310.56)	-0.00678* (-17.659)	0.97	311.86*	-1.549*
Dakshina Kannada	2.735 (2053.88)	-0.00164* (-7.618)	0.87	58.03*	-0.375*
Dharwad	3.112 (338.28)	0.00779* (52.652)	0.99	2772.27*	1.810*
Gulbarga	3.089 (213.65)	-0.00738* (-31.626)	0.99	1000.21*	-1.685*
Hassan	2.643 (731.86)	0.02019* (34.684)	0.99	1202.9*	4.758*
Kodagu	2.279 (1824.81)	0.00194* (6.276)	0.83	39.39*	0.449*
Kolar	2.648 (117.11)	0.01963* (5.387)	0.78	29.02*	4.625*
Mandya	2.792 (1824.81)	0.00803* (32.572)	0.99	1060.94*	1.867*
Mysore	2.995 (1050.22)	0.01662* (36.170)	0.99	1308.3*	3.902*
Raichur	3.138 (871.30)	0.01609* (27.722)	0.98	768.52*	3.775*
Shimoga	2.982 (2671.90)	0.00780* (43.531)	0.99	1894.95*	1.814*
Tumkur	2.727 (1941.27)	0.01291* (57.050)	0.99	3254.77*	3.018*
Uttar Kannada	2.445 (1803.33)	0.00562* (25.635)	0.98	657.18*	1.303*
State	4.192 (4811.45)	0.00779* (55.501)	0.99	3080.40*	1.811*

*indicates significance of value at P=0.01   Figures in parentheses indicates 't' value   LGR – Linear growth rate

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significance of the estimated function was established by the 'F' test. The 't' value was high and indicated overall significance of the functions. The supply of dry fodder in the state represents an increasing trend with a growth rate of 1.81 per cent annually. Hassan district had highest growth rate of 4.76 per cent, followed by Kolar district with a growth rate of 4.63 per cent. Kodagu district showed a lowest trend with a growth rate of 0.45 per cent. Some of the districts showed negative growth, which indicated a decreasing trend in growth rate over the years. All the districts showed positive and significant growth at one per cent in supply of dry fodder in the state.

Supply projection of dry fodder:

The total supply of cultivated dry fodder in each district and its projections from 2002-03 to 2010-11 AD have been analyzed and presented in Table 2.

The projections of dry fodder were made using the value of intercept and slope as given in Table 2. The table revealed that the availability of dry fodder increased at an average of 1.81 per cent per annum over the year. The dry fodder availability was 19854.38 thousand metric

tonnes in 2002-03 and increased to 22324.2 thousand metric tonnes in 2010-11 AD, representing an annual growth rate of 1.81 per cent. The availability across the districts differed depending upon the type of crop and its production. The Bijapur district showed highest supply of 2265.42 thousand metric tonnes in 2002-03 and increased to 2768.60 thousand metric tonnes in 2010-11. Similarly, Kodagu district showed lowest supply of 202.56 thousand metric tonnes in the year 2002-03 and it increased to 209.6 thousand metric tonnes in 2010-11 AD.

The growth rate of availability over the years was positive in 16 districts, the highest growth rate being in Hassan (4.758%) and lowest in Kodagu (0.449%). Declining trend in availability of dry fodder was observed in four districts *viz.*, Bidar (-1.957%), Chitradurga (-1.549%), Dakshina Kannada (-0.375%) and Gulbarga (-1.685%).

Demand estimation of dry fodder:

The simple linear regression coefficients for dry fodder demand in the state are presented in Table 3. The table revealed that the estimated intercept and slope

Table 2: Projected supply of dry fodder in Karnataka			(In 000' MT)		
Districts	2002-03	2003-04	2004-05	2005-06	2010-11
Bangalore (U)	247.09	249.25	251.42	253.60	264.40
Bangalore (R)	631.79	650.76	669.74	688.72	783.60
Belgaum	1503.39	1520.94	1536.94	1553.72	1637.60
Bellary	1326.23	1335.38	1344.53	1353.67	1399.40
Bidar	454.76	444.01	433.27	422.52	368.80
Bijapur	2265.42	2328.32	2391.21	2454.11	2768.60
Chikmagalur	447.20	454.83	462.45	470.07	508.20
Chitradurga	1056.76	1037.82	1018.87	999.92	905.20
Dakshina Kannada	515.45	513.44	511.43	509.43	499.40
Dharwad	1649.57	1675.25	1700.92	1726.60	1855.00
Gulbarga	959.94	940.93	921.91	902.89	807.80
Hassan	797.90	824.31	850.73	877.14	1009.20
Kodagu	202.56	203.44	204.32	205.21	209.60
Kolar	790.67	815.79	840.91	866.02	991.60
Mandya	796.28	808.99	821.709	834.42	898.00
Mysore	1627.66	1674.50	1721.34	1768.18	2002.40
Raichur	2228.17	2290.65	2353.13	2415.60	2728.00
Shimoga	1223.61	1242.69	1261.76	1280.63	1376.20
Tumkur	789.57	808.28	826.98	845.38	939.20
Uttar Kannada	340.29	344.25	348.22	352.18	372.00
State	19854.38	20163.11	20471.84	20780.56	22324.20

Table 3: Estimated growth rate of demand for dry fodder in Karnataka					
Districts	Intercept	Coefficient	R^2	F	LGR
Bangalore (U)	2.639 (162.89)	0.1165* (4.460)	0.71	19.89*	2.719*
Bangalore (R)	2.937 (1796.27)	0.00604* (22.918)	0.98	525.23*	1.400*
Belgaum	3.281 (4784.79)	0.00281* (25.432)	0.98	646.81*	1.049*
Bellary	3.073 (3785.65)	0.00453* (34.633)	0.99	1199.44*	1.049*
Bidar	2.765 (1569.15)	0.00828* (29.188)	0.99	851.95*	1.927*
Bijapur	3.133 (4609.75)	0.00401* (36.676)	0.99	1345.14*	0.929*
Chikmagalur	2.900 (2752.32)	0.00629* (37.044)	0.99	1372.27*	1.459*
Chitradurga	3.017 (3992.53)	0.00502* (4.258)	0.99	1702.26*	1.164*
Dakshina Kannada	3.097 (8906.17)	0.00427* 76.198)	0.99	5806.26*	0.988*
Dharwad	3.167 (4948.76)	0.00361* (35.065)	0.98	1229.56*	0.836*
Gulbarga	3.184 (5139.31)	0.00362* (36.318)	0.98	1319.04*	0.838*
Hassan	3.092 (5357.40)	00431* (46.379)	0.99	2151.09*	0.998*
Kodagu	2.352 (527.25)	0.01968* (27.378)	0.98	749.57*	4.637*
Kolar	3.039 (6146.77)	0.00480* (60.281)	0.99	3633.88*	1.112
Mandya	3.032 (5082.01)	0.00497* (51.750)	0.99	2678.09*	1.152*
Mysore	3.167 (3809.91)	0.00380* (28.405)	0.98	806.85	0.880
Raichur	3.123 (428.94)	0.00544* (4.642)	0.72	21.55*	1.262*
Shimoga	3.185 (8029.54)	0.00363* (56.830)	0.99	3229.66*	0.840*
Tumkur	3.184 (7214.70	0.00355* (50.027)	0.99	2502.76*	0.822*
Uttar Kannada	2.873 (1074.54)	0.00714* (16.568)	0.97	274.50*	1.657*
State	4.355 (8610.22)	0.00479* (58.786)	0.99	3455.90*	1.109*

*indicates significance of value at P=0.01   Figures in parentheses indicate 't' value and LGR – Linear growth rate

coefficients of the functions were statistically significant at one per cent. 'F' value was high in all the districts and indicated overall significance of the functions. The demand for dry fodder in the state represents an increasing trend with a growth rate of 1.11 per cent. The highest increasing trend of 4.64 per cent per annum was observed in Kodagu district followed by Bangalore urban district and lowest in Belgaum district. All the districts showed positive and significant growth at one per cent for requirement of dry fodder.

Demand projections of dry fodder:

The projections of demand for dry fodder are presented in Table 4. The total demand for dry fodder in each district and its projections from 2002-03 to 2010-11 AD are also presented. The projections were made using the value of intercept and slope given in Table 3.

Table 4 clearly indicates that the total demand for dry fodder increased at an average of 1.11 per cent per annum over the years. The annual requirement of dry fodder was worked out to be 26364.02 thousand metric

tonnes in 2002-03 and increased to 28491.2 thousand metric tonnes in 2010-11. The requirements of dry fodder varied in different districts dependent on livestock composition and growth trends in their population. The increasing trend was observed in all the districts. The highest benig Belgaum with the projected demand of 2092.61 thousand metric tonnes in 2002-03 and increased to 2195.4 thousand metric tonnes in 2010-11 AD. In the Belgaum district annual growth rate was 0.65 per cent. Kodagu district observed lowest demand of 402.36 thousand metric tonnes in 2002-03 and it increased to 506.8 thousand metric tonnes in 2010-11 AD. The state showed an increasing trend in all the districts. The highest increasing trend of 4.64 per cent per annum was observed in Kodagu district and Belgaum showed the lowest demand of 0.65 per cent per annum.

Gap between demand and supply of dry fodder:

The gaps between projected demand and supply of dry fodder are presented in Table 5.

For the state as a whole the gap was 24.69 per cent

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Table 4: Projected demand of dry fodder in Karnataka   (In 000' MT)

Districts	2002-03	2003-04	2004-05	2005-06	2010-11
Bangalore (U)	622.00	635.43	648.85	662.27	729.40
Bangalore (R)	1047.01	1060.06	1073.10	1086.15	1151.40
Belgaum	2092.61	2105.46	2118.31	2131.16	2195.40
Bellary	1367.63	1380.75	1393.87	1406.99	1472.60
Bidar	752.70	765.05	777.42	789.78	851.60
Bijapur	1543.36	1556.59	1569.82	1583.05	1649.20
Chikmagalur	967.57	980.05	992.53	1005.01	1067.40
Chitradurga	1220.16	1233.02	1245.88	1258.73	1323.00
Dakshina Kannada	1431.85	1444.84	1457.84	1470.83	1535.80
Dharwad	1649.31	1662.14	1674.98	1687.82	1752.00
Gulbarga	1717.20	1730.60	1744.00	1757.40	1824.40
Hassan	1416.95	1429.63	1442.91	1455.90	1520.80
Kodagu	402.36	415.42	428.47	441.53	506.80
Kolar	1274.87	1287.70	1300.65	1313.54	1378.00
Mandya	1261.04	1274.21	1287.38	1300.55	1366.40
Mysore	1659.44	1672.98	1686.53	1700.07	1767.80
Raichur	1573.81	1591.46	1609.11	1626.76	1715.00
Shimoga	1719.71	1733.16	1746.58	1760.02	1827.20
Tumkur	1711.18	1724.28	1737.38	1750.48	1816.00
Uttar Kannada	933.27	946.73	960.20	973.66	1041.10
State	26364.02	26629.92	26895.82	27161.72	28491.20

Table 5: Projected gap between demand and supply of dry fodder in Karnataka (In percentage)

Districts	2002-03	2003-04	2004-05	2005-06	2010-11
Bangalore (U)	60.27	60.77	61.71	61.71	63.75
Bangalore (R)	39.66	38.61	37.59	36.59	31.94
Belgaum	28.16	27.76	27.44	27.10	25.41
Bellary	3.03	3.29	3.54	3.79	90.53
Bidar	39.58	41.96	44.27	46.50	56.69
Bijapur	-46.78	-49.58	-52.32	-55.02	-67.88
Chikmagalur	53.78	53.59	53.41	53.23	52.39
Chitradurga	13.39	15.83	18.22	20.56	31.58
Dakshina Kannada	64.00	64.46	64.92	65.36	67.48
Dharwad	-0.02	-0.79	-1.55	-2.30	-5.88
Gulbarga	44.10	45.63	47.14	48.62	55.72
Hassan	43.69	42.35	41.04	39.75	33.64
Kodagu	49.66	51.03	52.31	53.52	58.64
Kolar	37.98	36.65	35.35	34.07	28.04
Mandya	36.86	36.5	36.17	35.84	34.28
Mysore	1.92	-0.09	-2.06	-4.01	-13.27
Raichur	-41.58	-43.93	-46.24	-48.49	-59.07
Shimoga	28.85	28.30	27.76	27.24	24.68
Tumkur	53.86	53.12	52.40	51.71	-47.18
Uttar Kannada	63.54	63.64	63.73	63.83	64.27
State	24.69	24.28	23.88	23.49	21.65

in 2002-03 and it gradually decreased to 21.65 per cent in 2010-11. Across the districts, Bijapur, Dharwad and Raichur were surplus in dry fodder in 2002-03 and in the year 2010-11, Bijapur, Dharwad, Raichur, Mysore and Tumkur districts were surplus in dry fodder production. Mysore district has surplus from 2002-03 onwards and Tumkur from 2005-06 onwards. Among the districts the highest gap was observed in Dakshina Kannada district (64%) in 2002-03 and the gap was increased to 67.48 per cent in 2010-11and year 2010-11, the highest gap was observed in Bellary district (90.53%). The lowest gap was observed in Mysore district (1.92%) in 2002-03. The gap was more than 50 per cent in four districts in 2002-03 and in eight districts in 2010-11, less than 10 per cent in two districts in 2002-03 and in the rest of the districts gap was between 25 and 50 per cent.

Enrichment of nutritive dry fodder through appropriate technologies like urea or biological treatment developed at the Research Centre. Transportation of dry fodder from surplus after densification. Use of bagasse as dry fodder after steam treatment and enrichment (near sugarcane plant).

In nutshell, the Karnataka would become a surplus state in dry fodder production as per the results indicated. It is desirable to undertake densification and enrichment for mitigating shortage during distress periods like natural calamities by encouraging ' Fodder Bank' through private enterprise if considered suitable. Rajagopal (1995) and Singh and Singh (1972) also carried out investigations on economics of fodder marketing and demand projection, respectively in M.P. and Punjab.

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