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A Survey on Livestock Health Care Delivery System in Maharashtra of India

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Abstract— *Feedback of 250 Livestock Development Officers (LDO) of Maharashtra state was taken regarding the livestock health care delivery system in pre constructed format. The study revealed that 17.60 % LDO were looking after five and more than five dispensaries and23.20 % LDO were taking care of livestock from more than 20 villages. Many of the LDOs (56.80 %) were also involved in different extension works such as implementation of Gov. Schemes, survey work and cattle show etc., besides treatment of animals. Majority of the officers (72.40 %) visited farmer's house as and when farmers called. Moreover, 69.60 % LDO informed that they visited village for the treatment of livestock very often.Most of the officers informed about sufficient stock of vaccine (82.00 %), antibiotic (60.00 %), anthelmentis and analgesics (63.60 %), but 42.00 % LDO reported scarcity of vitamin and mineral mixture.In respect of disease outbreak / occurrence, LDO reported outbreak of 22 diseases in livestock and poultry. Most occurrence of disease was FMD in cattle (28.00 %), followed by PPR in goat (24.80 %) and HS in cattle (14.40%). 31.20 % respondents reported more than two weeks time was needed to get diagnostic report of disease from the testing laboratory.32.80 % LDO informed that they reported to the District Animal Husbandry Officer regarding outbreak / occurrence of disease.The officers revealed that the regular vaccination was carried out against FMD (97.20 %),HS (93.20 %) and BQ (92.00 %). 35.60 % respondents reported vaccine failure and cause of vaccine failure was found to be improper storage and transportation of vaccine (17.20 %) followed by untimely vaccination (10.80 %) and some even doubted about the quality of vaccine. 47.60 % LDO reported the sufficient availability of acaricide and 67.20 % respondents informed sufficient availability of anthelmintic in the animal health center.Artificial Insemination was preferred over natural service by farmers for breeding of livestock as reported by 83.60 % respondents.Conception rate in AI was reported to be 45.27 %, whereas number of AI / conception was reported to be 2.85. Reason for preference of AI by most of the farmers was easy availability (46.00 %) followed by better conception rate (43.60%).*

Keywords— ***Delivery System, Health Care, Livestock, Maharashtra, Survey***

I. INTRODUCTION

Livestock sector plays an important role in socio economic development of our country. The success of livestock industry depends on good health of the livestock. Maharashtra is rich source of livestock population. As per 20th Livestock Census (1) the bovine livestock population of Maharashtra is 19.50 million out of which cattle population is 13.90 million (7.22 % of national population) and buffaloes population is 5.60 million (5.10 % of national population). In Maharashtra goat population is 10.60 million, which is 7.12 % of National population. Livestock thus is an important integral part to the sustainability of economy of this state. So, information on the livestock health care delivery system in Maharashtrawill definitely help the State Animal Husbandry Department to identify the constrains and issue related to proper health care management of livestock of the state. This in turn would help to plan properly to monitor and undertake prevention and control measures of livestock diseases well in advance.

Moreover, all those information was lacking. Therefore this survey work was conducted as a part of extension work in the year 2018 - 19.

II. MATERIAL AND METHODS

A structured questionare was developed for collecting data from Livestock Development Officers (LDO) of Maharashtra on livestock health care delivery system in the state. Survey was done and information was collected in preconstructed proforma. The questionare was pretested and the information was collected from 250 Livestock Development Officers belonging to almost all the regions and districts of Maharashtra. The questionnaire included information on (i) responsibilities of the officers (the number of hospitals under their jurisdiction, number of villages to be covered with population of animals, responsibilities/duties assigned other than related to health care, etc.), (ii) animal treatment (common diseases, visit to villages, diagnosis of conditions, availability of drugs and vaccines, organization of outreach programmes and health camps etc.), (iii) disease surveillance and monitoring (common disease outbreaks, testing samples and facilities etc.), (iv) vaccination (common vaccinations, frequency, storage and transport of vaccines, vaccination failure etc.), (v) control of parasites (methods used for control, availability of acaricides, frequency of deworming, etc.), and (vi) animal production, reproduction and minor surgeries (feeding practice, breeding method, availability of AI straws, and minor surgeries such as dehorning, castration, branding, hoof trimming, dystocia and caesarean section etc. Afterwards data were analyzed statistically (5) using SPSS 10.5 version software.

III. RESULTS

The respondent Livestock Development Officers (LDOs) were belonging to 33 districts of Maharashtra. The maximum participants were from Nagpur (15) district followed by Nashik (14) and Raigarh (14) district. It was observed that 60.00 % LDO were holding charge of one hospital / dispensary, whereas 17.60 % were taking care of five and more than five dispensaries (Table – 1) indicating inadequate number of officers in certain areas. In terms of coverage of villages by the LDOs, 25.20 % informed that they were treating livestock of 6 – 10 villages, while 23.20 % LDO reported of taking care of livestock from more than 20 villages. Most of the LDO (30.00 %) reported that population of animal was 501-1000. However, 20.00 % LDO reported that animal population was < 500 and 19.20 % also reported that it was 5001-10000. When information was taken on different activities performed by the officials other than animal health care, it was observed that 56.80 % LDOs were involved in different extension works such as implementation of Gov. Schemes, survey work and cattle show etc. 30.00 % LDOs were engaged in tagging of cattle under INAPH (Information Network for animal productivity and health), insurance etc. 25.60 % LDO were taking care of fodder development.20.00 % LDO were involved in different miscellaneous works such as election duty, examination duty, *swacchataabhiyan*, *gramsabha* meeting, and farm management. 14.40 % officers were busy in livestock census.

Table - 1: Responsibilities of Officers

SL NO	Particular	Frequency	% based on number of respondents
1	**Number of Hospital**		
a	One	150	**60.00**
b	Two	23	9.20
c	Three	15	6.00
d	Four	8	3.20
e	Five and above	44	17.60
f	Not Reported	10	4.00
2	**Number of villages**		
a	1-5	49	19.60
b	6-10	63	**25.20**

c	11-15	47	18.80
d	16-20	21	8.40
e	Above 20	58	23.20
f	Not Reported	12	4.80
3	**Population of Animals**		
a	<500	50	20.00
b	501-1000	75	**30.00**
c	1001-2000	24	9.60
d	2001-5000	43	17.20
e	5001-10000	48	19.20
f	Not Reported	10	4.00
4	**Responsibilities other than related to livestock health**		
a	Fodder development	64	25.60
b	Extension work, implementation of Govt. Scheme,survey, cattle show	142	**56.80**
c	AI, Supply of semen & liquid nitrogen	27	10.80
d	Livestock census	36	14.40
e	INAPH tagging of cattle, insurance	75	30.00
f	Miscelleneous activitieseg. election duty, examination duty, swacchata abhiyan, gramsabha meeting, farm management etc.	50	20.00
g	Training	18	7.20
h	Castration	6	2.40
i	Distribution of chick, egg	3	1.20

The most common disease condition reported by LDOs was digestive disorder (Table – 2 A) followed by reproductive disorder and metabolic diseases. The reproductive disease was second most important which was due to mineral and vitamin deficiency. Parasitic and infectious diseases stood IV th and V th rank. It was observed from Table – 2B that 72.40 % LDO visited farmer's house as and when farmers called. Moreover, 69.60 % LDO informed that they visited villages for the treatment of livestock very often. When LDOs were asked about the diagnostic methods, it was reported that 58.80 % LDOs diagnosed cases by clinical examination and 39.60 % by clinical examination & laboratory test both. In case of visit of LDO to farmer, 83.20 % LDO informed that response of farmers to their visit was favourable. 86.80 % LDO reported that they organize animal health camp quarterly. Table– 2C indicated stock of medicine in the dispensary. Most of the livestock development officers informed about sufficient stock of vaccine (82.00 %), antibiotic (60.00 %), anthelmentis and analgesics (63.60 %), but 42.00 % LDO reported scarcity of vitamin and mineral mixture.

Table – 2A: Common disease conditions:-

SL No	Particular	Mean	Ranking
a	Infectious	3.00	V
b	Parasitic	2.99	IV

c	Metabolic	2.89	III
d	Digestive	**2.34**	**I**
e	Reproductive	2.83	II
f	Others	4.93	VI

Table – 2B: Information on visit of LDO to farmer's house, disease diagnosis and health camp organisation

SL No	Particular	N.O. respondents	% of respondents
1.	**When will you visit a farmer / village?**		
a	As and when farmer calls	181	**72.40**
b	Periodically for regular health check	66	26.40
c	As per directive of the superior	26	10.40
d	Any other	20	8.00
2.	**How often you visit a village for treatment?**		
a	Very Often (every day / alternate day)	174	**69.60**
b	Often (weekly / fortnightly)	45	18.00
c	Sometimes (monthly / two months)	14	5.60
d	Rarely	14	5.60
	Not reported	3	1.20
3	**How will you diagnose a clinical case?**		
a	Clinical examination	147	**58.80**
b	Laboratory test	17	6.80
c	Both	99	39.60
d	Others	2	0.80
4	**How Often organise animal health camp?**		
a	Quarterly	217	**86.80**
b	Half Yearly	10	4.00
c	Yearly	6	2.40
d	Rarely	**7**	2.80
	Not reported	10	4.00
5	**Response of farmer for your visit**		
a	Favourable	208	**83.20**
b	Not so favourable	27	10.80
c	Unfavourable	1	0.40
	Not reported	14	5.60

Table – 2 C: Availability of vaccine and medicine in the hospital

SL No	Particular	Yes		No		Not Reported	
		N.O. resp	%of resp.	N.O. resp	%of resp.	N.O. resp	%of resp.
a.	Vaccime	205	82.00	17	6.80	28	11.20
b.	Antibiotic	150	60.00	52	20.80	48	19.20
c.	Analgesics	159	63.60	49	19.60	42	16.80
d.	Anthelmentics	159	63.60	50	20.00	41	16.40
e.	Min. & Vit.	97	38.80	105	42.00	48	19.20

In respect of disease outbreak / occurrence of diseases during past few years, LDO reported outbreak / occurrence of 22 diseases in livestock and poultry (Table – 3). 28.00 % respondent informed occurrence of Foot and Mouth Disease (FMD) in cattle, followed by PPR (Pesti des Petits Ruminitis) in goat (24.80 %) and Hemorrhagic Septicemias (HS) in cattle (14.40%). In the present study no outbreak of anthrax and swine fever was reported. 50.80 % LDO informed that they would able to know about outbreak of disease through farmer and 52.80 % reported through routine visit of field. Most frequently collected material for outbreak investigation by the officers was faecal samples (70.00 %), followed by blood (68.80 %) and urine (20.40%). Majority of the officers (about 53%) reported that they generally get lab test results within 2 weeks. On query about the reporting system of the outbreaks, the officers responded that they report to higher authorities in the department about the occurrence outbreak. Finally almost all LDO (90.80 %) informed that they undertook follow up visit of outbreak area.

Table - 3: Disease surveillance and monitoring:-

SL No	Particular	Frequency	% based on number of respondents
1	**Disease Outbreak**		
a	Foot and Mouth Disease	**70**	**28.00**
b	Haemorrhagic Septicemia	36	14.40
c	Black Quarter	35	14.00
d	Trypanosomiasis	4	1.60
e	Thilereosis	4	1.60
f	Babesiosis	3	1.20
g	Three Days Sickness	2	0.80
h	Tick Fever	2	0.80
i	Brucellosis	1	0.40
j	Glanders	1	0.40
k	Poisoning	4	1.60
l	Rabies	1	0.40
m	Pesti des Petits Ruminants	62	24.80
n	Enterotoxemia	12	4.80
o	Contagious Ecthyma	2	0.80
p	Goat Pox	4	1.60
q	Sheep Pox	5	2.00

r	Blue Tongue	1	0.40
s	Contagious Caprine Pleuro Pneumonia	2	0.80
t	Botulism	5	2.00
u	Ranikhet Disease	9	3.60
v	Fowl Pox	5	2.00
2	**How will you come to know about disease outbreak?**		
a	Through farmer	127	50.80
b	Through livestock supervisor	34	13.60
c	Through superior	4	1.60
d	Through routine visit	**132**	**52.80**
3	**What samples you generally collect for testing?**		
a	Fecal	**175**	**70.00**
b	Blood	172	68.80
c	Urine	51	20.40
d	Tissue	37	14.80
e	Any other	12	4.80
4	**How much time it will take to get test report?**		
a	< 1 d	19	7.60
b	2 - 3 d	41	16.40
c	4 - 7 d	30	12.00
d	1 - 2 w	43	17.20
e	> 2 w	**78**	**31.20**
	Not Reported	39	15.60
5	**To whom you report the occurrence of infectious diseases?**		
a	Higher authority	39	15.60
b	LDO (E)	21	8.40
c	ACAH	48	19.20
d	DAHO	**82**	**32.80**
e	DCAH	12	4.80
f	RJCAH / JCAH	32	12.80
g	Dean, Veterinary College	1	0.40
	Not Reported	15	6.00
6	**Do you undertake follow up visit?**		
a	Yes	**227**	**90.80**
b	No	8	3.20
	Not Reported	15	6.00

The results of Table – 4 A revealed that FMD vaccination was done by 97.20 % officers regularly, which was followed by HS (93.20 %) and BQ vaccination (92.00 %). In goat 91.60 % officers reported about PPR vaccination and 86.40

% reported about ET vaccination. Respondent per cent in case of other vaccines were poor. The vaccination frequency followed by officers for different diseases is depicted in Table – 4B, which indicates that officers, in majority of the cases, were following optimum vaccination schedule. It was observed from Table – 4 (C) that 66.80 % LDO reported storing and transportation of vaccine was done in refrigerator. However, ice pack and cool box were also used by 40.80 % and 38.00 % respondents respectively. Although majority of the officers (61.60 %) have not reported the occurrence of the disease after vaccination, 35.60 % respondents reported vaccine failure in the field condition in their opinions. Cause of vaccine failure was reported to be improper storage and transportation (17.20 %) which means poor maintenance of cooling chain from vaccine production to vaccine delivery to animals for immunization. Second cause of vaccine failure was untimely vaccination (10.80 %).

Table - 4 A: Vaccination of animals undertaken by the LDO:-

SL No	Particular	Frequency	% based on number of respondents
a	Foot & Mouth Disease (FMD)	243	97.20
b	Haemmorhegic Septicemia (HS)	233	93.20
c	Black Quarter (BQ)	230	92.00
d	Peti des Pestis Ruminitis (PPR)	229	91.60
e	Enterotoxemis (ET)	216	86.40
f	Ranikhet Disease (RD)	39	15.60
g	Fowl Pox (FP)	28	11.20
h	Brucellosis (BR)	14	5.60
i	Rabies (AR)	10	4.00
j	Gumbro disease (GD)	1	0.40
k	Sheep Pox (SP)	1	0.40

Table - 3 B: Vaccination scheduled of animals adopted by the LDOs:-

SL No	Particular	Vaccination Schedule	Frequency	% based on number of respondents
a	FMD	Once / year	7	2.80
		Twice / year	169	**67.60**
		As per supply	1	0.40
b	HS	Once/year	183	**73.20**
		Twice/year	15	6.00
		As per supply	2	0.80
c	BQ	Once/year	189	**75.60**
		Twice/year	13	5.20
		As per supply	2	0.80
d	PPR	Once/year	96	**38.40**
		Once/ 2 years	11	4.40
		Once/ 3 years	63	25.20
		As per supply	4	1.60

e	ET	Once / year	136	**54.40**
		Twice / year	33	13.20
		As per supply	3	1.20
f	RD	Once / year	2	0.80
		Twice/year	1	0.40
		As per supply	3	1.20
g	FP	As per supply	1	0.40

Table - 3 C: Vaccination storage, transport & failure:-

SL No	Particular	Frequency	% based on number of respondents
3	**How do you store & transport vaccine**		
a	Refrigerator	167	**66.80**
b	Cool Box	95	38.00
c	Ice Pack	102	40.80
d	Ice Box	37	14.80
e	Any Other	3	1.20
4	**Did you come across vaccine failure?**		
a	Yes	89	35.60
b	No	154	**61.60**
	Not reported	7	2.80
5	**If yes, what do you feel the cause of vaccine failure?**		
a	Poor quality vaccine	21	8.40
b	Improper storage and transportation	43	17.20
c	Untimely vaccination	27	10.80
d	Any Other	19	7.60
	Not reported	140	**56.00**

The results of the queries related to control of the parasitic diseases in animals are presented in Table 5. Among different methods of controlling external parasites, spraying was the most common (80.80 %) method used by field officers, which was followed by parenteral administration of medicine (51.20 %) and oral administration (32.00 %). The officials would arrange treatment by organization of animal health camp (58.80 %) followed by door to door visit of farmer (46.80 %). Frequency of applying acaricide was once / three months as reported by 47.20 % respondents followed by once / month (21.60 %). 47.60 % LDO reported the sufficient availability of acaricide in the dispensary while, 33.20 % reported insufficient availability. Regarding the control of internal parasites, majority of the officers (73.20 %) reported that they did deworming once in three months, whereas 16.80 % LDO performed deworming once / six months. 67.20 % respondents informed sufficient availability of anthelmentic in the dispensary. However, 27.20 % reported insufficient availability of anthelmentics (Table – 5).

Table - 5: Control of Parasitic diseases:-

SL NO	Particular	Frequency	% based on number of respondents
1	**Methods used for control of external parasite**		
a	Spraying	202	**80.80**
b	Diping	42	16.80
c	Oral administration	80	32.00
d	Parentral administration	128	51.20
e	Any Other	2	0.80
2	**How do you generally organize treatment**		
a	Organization of camp	147	**58.80**
b	Door to door visit	117	46.80
c	Ask the owner of animal to spray acaricide	75	30.00
d	Through livestock supervisor	14	5.60
e	Any Other	1	0.40
3	**How often do you advice to spray acaricide**		
a	Once every month	54	21.60
b	Once in three months	118	**47.20**
c	Once in six months	35	14.00
d	Once in a year	8	3.20
e	Rarely	9	3.60
	Not reported	26	10.40
4	**Do you have ready availability of acaricide ?**		
a	Sufficient	119	**47.60**
b	Insufficient	83	33.20
c	Not present	28	11.20
	Not reported	20	8.00
5	**How often do you advice for deworming ?**		
a	Once every month	20	8.00
b	Once in three months	183	**73.20**
c	Once in six months	42	16.80
d	Once in a year	4	1.60
e	Rarely	1	0.40
6	**Do you have ready availability of anthelmentics ?**		
a	Sufficient	168	**67.20**
b	Insufficient	68	27.20
c	Not present	9	3.60
	Not reported	5	2.00

Part 6 of the questionnaire was related to the queries on production/reproduction activities and minor surgeries performed by the officers. The analysis of the results revealed that 94.40 % LDO informed that farmers come regularly to them for advice

on feeding and breeding of their livestock (Table – 6). Artificial Insemination was preferred over natural service by farmers for breeding of livestock as reported by 83.60 % respondents. Regarding the availability of semen straw, 91.60 % LDO reported that they got sufficient quantity of semen straw for AI. Conception rate in AI was reported to be 45.27 %, whereas number of AI / conception was reported to be 2.85. Easy availability (46.00 %) and better conception rate (43.60 %) were the reasons of preference of AI by most of the farmers. Majority of LDOs (87.20 %) reported that they performed minor surgical procedures such as dehorning, castration, branding and hoof trimming. Patteler desmotomy was reported to be performed by 55.20 % LDO. 90.80 % officers reported to have handled dystocia cases and 56.40 % officials performed caesarian section with the success rate of 67.13 %.

Table – 6: Animal Production / Animal Reproduction and Minor Surgery undertaken by LDO :-

SL NO	Particular	Frequency	% based on number of respondents
1	**Do the animal owners ask for advice on feeding and breeding?**		
a	Yes	236	**94.40**
b	No	12	4.80
	Not Reported	2	0.80
2	**Which method is preferred by the farmers for reproduction?**		
a	Natural Service	36	14.40
b	AI	209	**83.60**
	Not Reported	5	2.00
3	**Do you get enough good quality semen straw for AI ?**		
a	Yes Sufficient	229	**91.60**
b	Insufficient	10	4.00
c	No	4	1.60
	Not Reported	7	2.80
4	**What is the conception rate (%) in AI**	45.27	
	What is the number of AI / conception?	2.85	
5	**Why do you feel AI is preferred / not preferred by majority of famers?**		
a	Better conception rate	109	43.60
b	Easy availability	115	**46.00**
c	Economical	94	37.60
d	Increased milk production	103	41.20
e	Any other	2	0.80
	Reason of non-preference	6	2.40
a	Less conception rate	4	1.60
b	Not easily available	1	0.40
c	Any other	1	0.40
6	**Do you undertake dehorning, castration, branding, hoof trimming?**		
a	Yes	218	**87.20**
b	No	23	9.20

	Not Reported	9	3.60
7	**Do you perform pattelerdesmotomy?**		
a	Yes	138	**55.20**
b	No	103	41.20
	Not Reported	9	3.60
8	**Do you handle dystocia case?**		
a	Yes	227	**90.80**
b	No	14	5.60
	Not Reported	9	3.60
9	**Do you perform caesarian section?**		
a	Yes	141	**56.40**
b	No	95	38.00
	Not Reported	14	5.60
10	**If yes, success rate (%)**		67.13

IV. DISCUSSION

Survey of 250 livestock development officers (LDO) revealed that most of the participants were from Nagpur district of Maharashtra. It was observed that most of the LDO were holding charge of one hospital, treating livestock of 6 – 10 villages with animal population of < 500. Most of the LDOs were involved in different extension works such as implementation of Gov. Schemes, survey work and cattle show etc. besides animal treatment. The most common disease condition was digestive followed by reproductive disorder and metabolic diseases. However, it was reported (2) that the digestive diseases were the major cause of mortality in cattle in Maharashtra. Lack of proper hygiene and sanitation in animal shed, lack of balance feeding, improper housing and feeding management were the contributing factors for higher digestive disorders. The cause of lower parasitic and infectious disease was due to regular deworming and vaccination programme conducted by LDOs of Maharashtra animal husbandry department. Most common method of diagnosis of different cases was by clinical examination. Most of the LDO informed about sufficient stock of vaccine, anthelmentis, but scarcity of vitamin and mineral mixture in their respective dispensary.

In respect of occurrence of diseases during past few years, LDO reported highest incidence of Foot and Mouth Disease (FMD) in cattle, followed by PPR (Pesti des Petits Ruminitis) in goat and Hemorrhagic Septicemias (HS) in cattle. In another study (3), it was revealed that Pesti des Petits Ruminants in goat was most important infectious disease in Maharashtra followed by Foot and Mouth Disease and Blood Protozoan Diseases in cattle & buffalo. In contradiction to present findings it was reported (4) that outbreak of livestock diseases in Maharashtra during 2005 – 16, was highest in Black Quarter (203) followed by Haemorrhagic Septicaemia (176), Pesti des Petits Ruminants (137), Swine Fever (36), Sheep and Goat Pox (33), Foot and Mouth Disease (6), Sheep and Goat Anthrax (18), Enterotoxaemia (17) and Bovine Anthrax (7). They also informed that most frequently collected material for outbreak investigation by the officers was faecal samples. Finally almost all LDO informed that they undertook follow up visit of outbreak area. It was also revealed from survey that in cattle and buffalo FMD vaccination was done maximum followed by HS and BQ vaccination. In goat PPR vaccination was done maximum followed by ET vaccination. Most of the officers reported that storing and transportation of vaccine was done in refrigerator. Quite a good number of respondents reported vaccine failure in the field condition in their opinions and cause of vaccine failure was reported to be improper storage and transportation.

Among different methods of controlling external parasites, spraying was the most common method used by field officers. Frequency of applying acaricide and deworming against internal parasite was reported mostly to be once / three months. Most of the officials informed sufficient availability of acaricide and anthelmentic in the dispensary. However. scarcity of medicine was also reported by few LDOs. Most of the respondents reported that artificial insemination was preferred over natural service by farmers for breeding of livestock due to easy availability of semen and better conception rate. Regarding the availability of semen straw, mostly reported that they got sufficient quantity of semen straw for AI. Majority of LDOs reported that they performed minor surgical

procedures such as dehorning, castration, branding and hoof trimming etc. and Patteler desmotomy was reported to be performed by mostly. It was also reported that most of the LDOs handle dystocia cases and perform caesarian section with the high success rate.

V. CONCLUSION

Veterinary and animal husbandry services of the state Governments play a vital role for optimum production in livestock sector as well as proper disease and health management of the livestock. The present survey on veterinary health care delivery system in Maharashtra state revealed a satisfying performance in terms of disease control and management measures adopted in the state. It also highlighted the keenness of the officers to reach out to the farmers and undertake different activities for the benefit of the livestock owners. However, there seems to be some areas for improvement such as inadequate number of LDOs in certain areas as reflected by officers having the charge of 3 to 5 dispensaries/hospitals and had to cover more area and large number of animals, which may affect the service delivery. Further, strengthening of the support system of laboratories for testing and rapid diagnosis would be of great help in disease and health care management. Moreover all the animal health centers / dispensaries should ensure availability of most of the important medicines, particularly mineral & vitamin mixture and vaccine for the livestock owners for maintaining health and production of livestock

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REFERENCES

[1] Anonymous. (2019). 20 th Livestock Census. Dept. of Animal Husbandry and Dairying, Ministry of Fisheries, Animal Husbandry and Dairying, Govt. of India.

[2] Bangar Y., Khan T. A., Dohare A. K., Kolekar D. V., WakchaureN. And Singh B. (2013). Analysis of morbidity and mortality rates in cattle in Pune division of Maharashtra state, *Vet. World, 6 (8)*: 512 – 515.

[3] Das S. K., Aithal H. P. and Bhilegaonkar K. N. (2020). A Survey on the Occurrence of Livestock Diseases and Constrains in Controlling those Disease in Maharashtra. *International J. Livestock Res., 10 (2)*: 89 - 96.

[4] Krishnamoorthy P., Tatwarthy S.B., Suryawanshi S.N., Shome B.R., Suresh K.P. and Roy Parimal. (2018). Spatial and Temporal Epidemiological Analysis of Livestock Diseases in Maharashtra State. Research & Reviews: *Journal of Veterinary Science and Technology, 7(1)*: 16 - 23.

[5] Snedecor, G. W. and Cochran, W. G. (1994). Statistical Methods. 6 th Edition. Oxford and IBH Pub Co., New Delhi.