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AN OVERVIEW OF COMPONENTS AND OUTPUTS OF LIVESTOCK RESEARCH IN TAMIL NADU

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ABSTRACT

An attempt was made to overview the conduct, components and output of various livestock research activities conducted in TANUVAS for the period from 2008 to 2018. Among 152 projects completed during the study period, there were 52 health projects, 36 production, 25 social science, 16 clinical science, 14 infrastructure, six processing, two environment and one education related projects. The research investment of projects completed from 2008 to 2018 was found to be the highest for Health (Rs.1767.70 lakhs), followed by Infrastructure (Rs.1723.40 lakhs), Production (Rs.668.72 lakhs), Social science (Rs.393.82 lakhs), Clinical science (Rs.360.28 lakhs), Education (Rs.221.47 lakhs), Processing (Rs.87.50 lakhs) and Environment (Rs.14.64 lakhs). Among various livestock species, Poultry research occupied predominant position with 39 numbers of projects with outlay of Rs.791.25 lakhs. It should be noted that the research on companion animals and fodder were less than 10 in last ten years. A total of 44 patents were filed in TANUVAS during last decade, among which seven were granted. It is concluded that the focus should also be made on fodder, swine and companion animal and fodder research.

Key words: Livestock, research prioritization, components, outcome

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INTRODUCTION

The livestock sector being growth engine plays a significant role in socio-economic development of the State. However, the momentum of growth may succumb to acute deceleration in future if the sector is not supported by technologies, investments, institutions and infrastructure (Jha and Singh, 2015). There is a strong link between research

investments / innovations and productivity growth. However, there is a long lead time between research stage of new technology and the point at which that technology is adopted and begins to affect productivity (Fuglie and Heisey, 2007). According to Alston *et al.* (1995), the benefits of research and development would be realized after 5 to 7 years of investment and the benefits would increase and reach to their peak for about 15 years after research investment and the benefits would sustain for about 25 years and would decrease thereafter. There are many research innovations / technologies are being developed in the livestock sector and Tamil Nadu Veterinary and Animal Sciences University (TANUVAS) is the primary Research Institution at the State level. In the present study, an attempt was made to overview the conduct, components and output of various livestock research activities conducted in TANUVAS.

MATERIALS AND METHODS

The process of resource allocation for agricultural research in India was based on concerning problems and opportunities, which involved a lot of subjectivity. Various challenges in livestock research include expanding research system, chronic scarcity of resources for research and increasing severity and complexity of research needs (Birthal *et al*., 2002). In this context, data on externally funded research projects completed in TANUVAS from the year 2008 to 2018 were collected from the Directorate of Research, TANUVAS to ascertain the research outputs and outcomes. The data were summarised using frequency, central tendency measures, common tabulation and graphical tools. The research activities undertaken at research stations through TANUVAS funding and post graduate research activities were not considered for the present study due to time and budget constraints. Hence, caution may be taken while making conclusions and generalizations.

RESULTS AND DISCUSSION

In Tamil Nadu, TANUVAS is the primary Research Institution at the State level and it introduces many innovations / technologies for the livestock development in the State. An attempt is made to summarize the research activities of externally funded research projects completed from the year 2008 to 2018. Research activities funded by the University (Research stations) and post graduate research were not taken into consideration for the present study due to time and budget constraints. The particulars of externally funded projects completed in TANUVAS from the year 2008 to 2018 along with budget details are shown in Table 1, In TANUVAS, 152 externally funded projects with the budget outlay of Rs. 52.38 crores were completed from the year 2008 to 2018. The average project duration was found to be 27.89 months. The average budget outlay of the externally funded projects for the year 2008 to 2018 was Rs.34.69 lakhs.

Table 1. Projects completed in TANUVAS from the year 2008 to 2018

Year	Number of projects	Total budget outlay in Rs. lakhs	Average project duration in months	Average budget outlay in Rs. lakhs
2008	21	237.57	23.95	11.31
2009	9	105.10	29.78	11.68
2010	19	403.89	21.42	21.26
2011	13	116.83	19.54	8.99
2012	14	151.54	20.00	11.66
2013	12	783.98	27.25	65.33
2014	13	1087.33	34.46	83.64
2015	19	812.75	34.74	42.78
2016	8	612.33	36.25	76.54
2017	17	549.24	36.12	32.31
2018	7	376.97	26.86	53.85
Overall	**152**	**5237.53**	**27.89**	**34.69**

The number of projects completed in TANUVAS was found to vary over past 11 years, with the maximum of 21 during 2008 and minimum of seven during 2018. The research investments were found to be lower than Rs. 400 lakhs or slightly over that from the year 2008 to 2012. The research budget was found to increase to 784 lakhs during 2013 and Rs.1087 lakhs during 2014, which was found to be maximum research investment during the entire study period. The research budget of completed projects was found to decrease continuously from Rs.812.75 lakhs in the year 2015 to Rs.376.97 lakhs in the year 2018.

The component-wise split of completed projects from the year 2008 to 2018 is presented in Table 2, Fig.1 and Fig.2. Among 152 projects completed during 2008 to 2018, there were 52 health projects, 36 production, 25 social science, 16 clinical science, 14 infrastructure, six processing, two environment and one education related projects. The research investment of projects completed from 2008 to 2018 was found to be the highest for Health (Rs.1767.70 lakhs), followed by Infrastructure (Rs.1723.40 lakhs), Production (Rs.668.72 lakhs), Social science (Rs.393.82 lakhs), Clinical science (Rs.360.28

lakhs), Education (Rs.221.47 lakhs), Processing (Rs.87.50 lakhs) and Environment (Rs.14.64 lakhs).

Out of the total externally funded projects completed from the year 2008 to 2018 in TANUVAS, Livestock Health related projects comprised 34 per cent to the total number of projects and attracted 34 per cent to the total research budget, as well. During the same period, Production related research comprised 24 per cent in terms of numbers and 13 per cent in terms of budget. Social science and Clinical science comprised 16 per cent and 11 per cent in terms of numbers, respectively and 7 per cent each in terms of budget.

Although infrastructure projects comprised only 9 per cent in terms of numbers, it attracted 33 per cent in terms of total budget. Processing projects comprised 4 per cent of total number of projects and attracted 2 per cent of the total research budget. Although education related project comprised about one per cent of the number of research projects, it attracted about four per cent of the total budget. Environment related projects comprised to a meagre per cent in terms of numbers (one per cent) and budget (less than one per cent). Overall, it could be concluded that the performance of the health sciences is the best, followed by production sciences in terms of both numbers as well as the budget. The social sciences performed better in terms of number of projects and infrastructure projects performed better in terms of budget.

The split-up particulars of completed projects in TANUVAS from the year 2008 to 2018 are shown in Table 3, Fig.3 and Fig.4. During the last ten years, about 31 completed projects with budget outlay of Rs.2082.65 lakhs were species non-specific. In TANUVAS, about 27 projects with budget of Rs.643.08 lakhs were carried out in large ruminants, 15 projects with budget of Rs. 383.10 lakhs were on small ruminants. Among various livestock species, poultry research occupied predominant position with 39 numbers of projects with outlay of Rs.791.25 lakhs. It should be noted that the research on companion animals and fodder were less than 10 in last ten years. There were three research projects each on wild animals and laboratory animals and two projects on pigs.

About 14 projects were conducted on product processing with an outlay of Rs.750.49 lakhs. It could be inferred that investment made on product processing unit / plant might have improved the infrastructure facilities in TANUVAS to conduct further research activities. It should also be noted that two projects were conducted in the field of education with an outlay of Rs.222.07 lakhs. It is evident that the number of projects were the maximum for poultry (39), followed by non-specific livestock and poultry (31), large ruminants (27), small ruminants (15), products processing (14), companion animals (9), fodder (7), laboratory animals and wild animals (each 3) and pigs and education (each 2). In terms of budget, the project investment was the highest for species non-specific livestock, followed by poultry, product

processing, large ruminants, small ruminants, education, fodder, companion animals, pigs, laboratory animals and wild animals as shown in Fig.7.

The findings contrasted with findings of Birthal *et al.* (2002), where, buffalo occupied the predominant species (40 per cent) for research focus at national level followed by cattle (38 per cent). Although various states have variations in research focus due to regional and climatic variations, buffalo should be a focussed area of research considering the continuous decline in the buffalo population and production in recent years in Tamil Nadu. The study concurs with the findings of Das and Khunt (2008), Jha and Singh (2015) and Bardhan *et al.* (2022), who emphasized on cattle and buffalo research in Gujarat, Bihar and India, respectively.

The resources allocated to livestock research in India have not been equivalent with the contribution of livestock to agricultural gross domestic product (Birthal *et al*., 2002 and Birthal and Negi, 2012) and the livestock research demands highest share (33.9 per cent) of the total resources as recommended by Kumar *et al.* (2013). As recommended by Bardhan *et al.* (2022), poultry research prioritization in southern states of India, Tamil Nadu had 39 externally funded research projects specifically for poultry with the research outlay of Rs. 791.25 lakhs from the year 2008 to 2018. Although, research on poultry and meat processing was not recommended by Das and Khunt (2008) in Gujarat, they may be focussed in Tamil Nadu considering their economic importance and growth potential.

Livestock health and clinical research would indirectly helpful in augmenting livestock production and this might be reasons for substantial number of externally funded projects conducted in Tamil Nadu during the study period (68 projects with budget outlay of Rs.2127.98 lakhs). Various studies by Steinfeld *et al.* (2006), McMichael *et al.* (2007) and Ilea (2009), reported that livestock industry as the source of broad spectrum of environmental impacts including climate change and greenhouse gas emissions. However, there was only two externally funded research projects conducted on environmental impact and livestock sector in Tamil Nadu during the year 2008 to 2018, which critically warrants such livestock and environmental research in Tamil Nadu.

A synchronous functional operation of Government and veterinary colleges provides uninterrupted supply of human resource to carry out the state development programmes. (Rana and Kumar, 2017). However, only one externally funded research project was conducted in Tamil Nadu during the year 2015. Although Veterinary Council of India (VCI) and Indian Council of Agricultural Research (ICAR) frames curriculum and regulations for Veterinary Undergraduate Education and Post graduate education, respectively in India, the policy research on veterinary education would be helpful in need based re-orientation of veterinary education in India. Livestock sector can play an important role

Table 2. Component-wise split of completed projects from 2008 to 2018

Budget in Rs. lakhs

Year of completion	Clinical		Education		Environment		Health		Infrastructure		Processing		Production		Social		Overall	
	No.s	Budget	No.s	Budget	No.s	Budget	No.s	Budget	No.s	Budget	No.s	Budget	No.s	Budget	No.s	Budget	No.s	Budget
2008	1	11.16					10	83.47			1	1.69	2	20.48	7	120.77	21	237.57
2009	4	21.96									2	53.06	1	5.00	2	25.08	9	105.10
2010	3	237.53					8	107.98					6	35.08	2	23.30	19	403.89
2011	1	4.42			1	3.84	3	28.64	1	25.00	1	30.00	5	18.69	1	6.24	13	116.83
2012	5	55.23					2	39.87			1	0.77	3	28.67	3	27.00	14	151.54
2013	1	9.50					6	510.17	3	232.74			1	19.45	1	12.12	12	783.98
2014							5	247.94	2	697.55			6	141.84			13	1087.33
2015			1	221.47			3	86.73	4	309.57	1	1.98	5	136.89	5	56.11	19	812.75
2016	1	20.48					3	285.08	1	194.72			3	112.05			8	612.33
2017							9	199.06	2	109.82			4	150.57	2	89.79	17	549.24
2018					1	10.80	3	178.76	1	154.00					2	33.41	7	376.97
Overall	**16**	**360.28**	**1**	**221.47**	**2**	**14.64**	**52**	**1767.70**	**14**	**1723.40**	**6**	**87.50**	**36**	**668.72**	**25**	**393.82**	**152**	**5237.53**

Table 3. Split-up particulars (species and products) of completed projects from 2008 to 2018

Sector	Species / Products	Project particulars	
		Numbers	Budget in Rs. lakhs
Livestock	Cattle	7	178.05
	Buffaloes	4	92.24
	Bovines	16	372.79
	Sheep	5	31.76
	Goats	6	81.69
	Small ruminants	4	269.65
	Pigs	2	55.00
	Fodder production	7	170.45
Poultry	Broilers	14	38.83
	Layers	4	37.33
	Chicken	18	669.09
	Duck	1	29.17
	Turkey	2	16.83
Livestock and Poultry	Multi-species (non-specific)	31	2082.65
Companion animals	Dogs	9	80.65
Laboratory animals	Laboratory animals	3	50.45
Wild animals	Wild animals	3	8.34
Products	Dairy products	8	336.48
	Meat products	3	198.52
	Livestock products	1	20.00
	Food products	2	195.49
Education	Education	2	222.07
Overall		**152**	**5237.53**

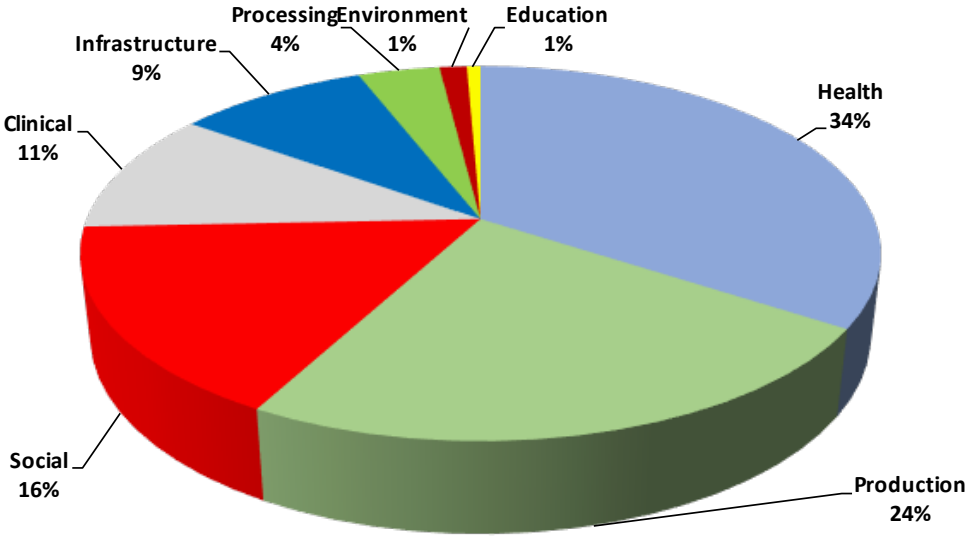

Fig. 1. Share of components in completed research projects (2008 to 2018)

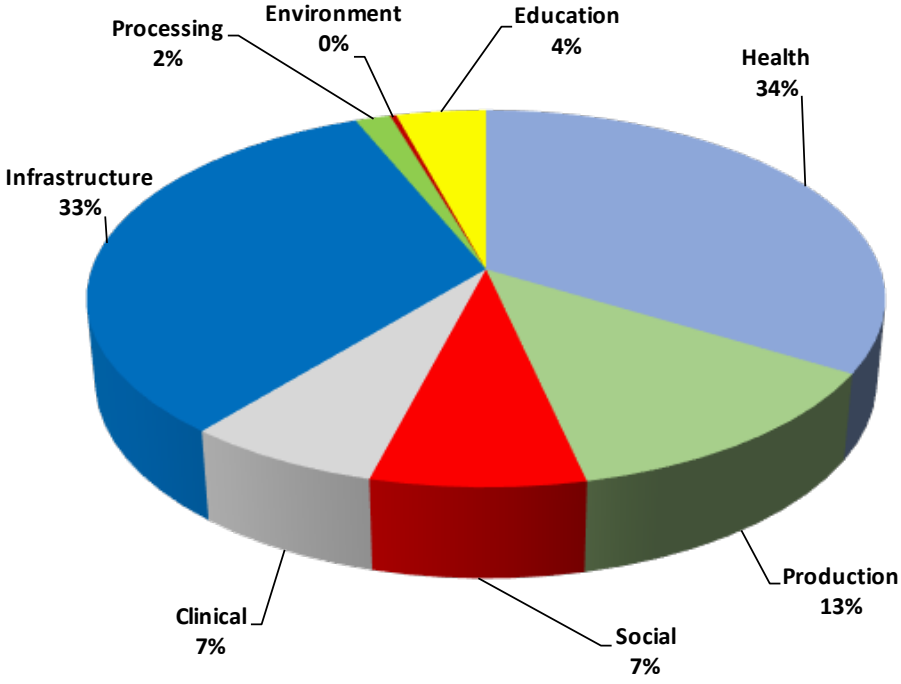

Fig. 2. Share of components in budget of research projects (2008 to 2018)

in poverty alleviation, income enhancement, risk reduction and also women empowerment for poor rural households (Anupam, 2020). Although, 25 research projects in sociological aspects of livestock sector in Tamil Nadu, it needs to be further augmented in order to ascertain the constraints, research needs, adoption and impact of various technologies among the farming communities.

The food processing sector including milk and milk products, meat and poultry sector is a sunrise industry of the Indian economy and has been identified as a thrust area for development (Ali, 2007). However, only six externally funded research projects with the tune of Rs.87.50 lakhs were conducted in Tamil Nadu during the period 2008 to 2018, which necessitates the intense research on livestock processing sector. Further, research on the behavioural, husbandry, and medical needs of exotic pets is also necessary to enhance their quality of life and to contribute to the comparative understanding of diseases in other species. Thus, study of wildlife diseases contributes not only to wildlife health and conservation but also to the study of emerging infectious diseases, many of which are zoonotic (NRCC, 2005).

The research outcome in terms of approval and filing of patents is shown in Tables 4 and 5. About 44 patents were filed in TANUVAS during last decade, among which seven were granted. About four patents were withdrawn / deemed to be withdrawn. There were 25 patents published and three were published and abandoned. About five patents were not published. As a whole it could be concluded that 16 per cent of the patents filed were granted.

Table 4. Particulars of patents filed in TANUVAS during last ten years

S.No.	Particulars	Numbers
1.	Number of patents granted	7
2.	Number of patents withdrawn / deemed to be withdrawn	4
3.	Number of patents published and abandoned	3
4.	Number of patents filed and published	25
5.	Number of patents filed and not published	5
	Total number of patents applied	**44**

The year-wise details of patents filed and granted are shown in Table 5. It could be inferred that number of patents filed varied over years and it was maximum during the year 2018 (9), followed by the year 2014 (7). There were no patents filed during the years 2009 and 2019. During the year 2019, there were two patents granted and each one granted during the years 2010, 2011, 2012, 2016 and 2018.

Table 5. Year-wise patents filed and granted

Year	Patents filed	Patents granted
2008	1	
2009		
2010	1	1
2011	5	1
2012	4	1
2013	2	
2014	7	
2015	1	
2016	2	1
2017	5	
2018	9	1
2019		2
TOTAL	**37**	**7**

CONCLUSIONS

As there was very meagre research on buffalo and also drastic reduction in buffalo population in the State, vigorous thrust should be made to conduct buffalo research in Tamil Nadu. Keeping in view of the above results, the research focus should also be made on fodder, swine and companion animals, apart from cattle and small ruminants. Further, importance may be given for fodder based research as livestock production (milk and meat) depends largely on fodder production. Also, social research needs to be conducted to explore the problems encountered in the livestock / poultry production. The research should be conducted to evolve feasible and economical solutions to the identified problems. Further, these solutions should be made available to the end users in order to harvest the real research outcome.

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