

Adoption of Livestock Innovation: A Case of 'T&D' Pig Breed in Eastern Region of India

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Abstract

The adoption of livestock technologies in many developing countries including India is dismally low due to considerable gap in the technologies developed at research institutions and technologies actually being adopted by the farmers. The authors studied the adoption of improved livestock breed innovation, taking a case of a new pig breed ('T&D') - an innovation. Survey was conducted over 240 pig farmers purposively selected four states, viz. Jharkhand, Bihar, Chhattisgarh and West Bengal and one district was selected from each state, based on the concentration of pig farmers with the assistance of KVKs in these states. As such, 240 pig farmers @ 60 pig farmers from each district were selected randomly across 4 states. Research paper highlights the stage of adoption process, awareness to adoption, time taken in adoption and time lag in adoption of 'T&D' pig innovation. The study revealed that overall cent-per cent (100.00%) of the pig farmers were aware of 'T&D' pig innovation across the four states under study. Whereas, 69.20 per cent, 38.75 per cent and 65.00 per cent of the respondents passed through interest stage, trial stage and evaluation stage, respectively, under the study area. Most of the pig farmers (87.90%) across the four states under the study were found in adoption stage of 'T&D' pig innovation. Awareness that convinced to adopt 'T&D' pig was perceived in 1994 (1.25%) and majority of the farmers became aware about T&D pig first in year between 2000 to 2005. Result indicated that only 10.4 per cent farmers had taken one year time to adopt the innovation. Majority farmers (18.30%, 23.75%, 23.30%, 12.90% and 7.50%) had taken time two, three, four, and six years to adopt 'T&D' pig innovation, respectively. Majority of the farmers (34.70%) adopted 'T&D' pig in the fourth year of its introduction in the social system indicating that there was adequate time lag in adoption of 'T&D' pig innovation.

Key words: Adoption, innovation pig, breed, time-lag.

1. INTRODUCTION

The adoption of livestock innovations in developing countries including India has attracted considerable attention because it can provide the basis for increased production and income [6]. However, evidence indicates that most of the adoption studies so far conducted in the country are largely focused on improved dairying and poultry practices. The attention paid to the development, diffusion and adoption of improved pig breed till date is minimal. Whereas, the adoption rate of modern livestock technologies in general is very low in India. The NSSO survey conducted in 2003 among 55000 farmers across the country revealed that only 5.1 per cent of the farmers' households in India were able to access information on animal husbandry against 40.4% households accessing information on modern technology for crop farming [5].

Studies undertaken to understand the adoption of livestock technologies like 'T&D' pig would enhance the understanding of the researchers/ innovators and extension workers about dynamics of livestock technology transfer in Indian conditions. The need for such type of research on adoption of livestock innovation becomes more urgent particularly for the

tribal population, which constitute the weakest and vulnerable section of the society and towards which a large number of target group oriented programmes are directed. Moreover, understanding the adoption of livestock innovation ('T&D' pig breed) would highlight the resources available with farm family, socio-economic environment, breeding change, feeding, management, health care and marketing practices being followed by the target group which influence the adoption process[1]and [7].

'T&D' pig being exposed to extension and development interventions for more than a decade among tribals of Jharkhand and other neighbouring states have offered two options to the farmers. They have to decide either taking up of technologies and information needed for sticking to their own practices i.e. rearing local breeds or adopting 'T&D' breed[3]and [7]. These decisions of pig growers are determined by number of factors: viz. level of management skills, degree of current production problems, needs and interests of individuals, attitude and perception of pig growers and extension services active in Jharkhand and other adjoining states [1]and [4]. Since, these behavioural decision making factors are not studied before in the study area, there is a need to study pig growers' perception of extension services and adoption behaviours of pig growers to fill the existing information gap in the field of extension communication and diffusion-adoption studies. The diffusion of 'T&D' pig and its adoption and consequences at the level of farmers and society has potential to bring in findings which will help further understand the status of farmers' technology adoption dynamics in rural areas. There is clearly a research gap, since adoption of livestock technologies in general and 'T&D' pig in particular has not been studied so far. Therefore, this study was undertaken towards bridging the gap with regards to pig production technology, adoption and extension service acceptance in the study area in specific context of livestock technology i.e. 'T&D' pig innovation. Pig production in India is characterized with wide gap between research and adoption. Most of the research results and recommended innovations

concerning pigs in particular have remained confined to the four walls of laboratories and libraries.

It is, however, gratifying to note that Government of India initiated Comprehensive Piggery Development Programme in 1959-60 towards the end of 2nd five year plan. In an attempt to increase livestock productivity and improved food security at both national and household level, efforts have been underway to generate and disseminate improved livestock technologies among small holder farmers.

'T&D' pig is one of the technologies developed and considered appropriate, thus, promoted in Jharkhand and other parts of the country for enhancing sustainable livestock production with both environmental and socio-economic benefits. 'T&D' pig is widely spread in Jharkhand, Bihar, West Bengal, MP and North Eastern states. Especially, in recent past, its adoption is growing at fastest rate throughout Jharkhand as its benefit is observable over the years [12]. 'T&D' pig, therefore, is an innovation being diffused for adoption by the farmers through different channels under different schemes towards varying degree of its acceptance by the different categories of farmers[10] and [11].

2. MATERIAL AND METHODOLOGY

The study employed purposive and multistage random sampling technique to select the ultimate sampling units. 'T&D' pig was developed at Birsa Agricultural University, Ranchi, Jharkhand in 1989 and gradually spread within Jharkhand state (23° 23' N and 85° 23' E) and in its adjoining states, viz. West Bengal (23° 14' N and 87° 07' E), Bihar (42° 49' N and 85° 01' E) and Chhattisgarh (22° 53' N and 84° 12' E) were selected for the study. The latitude and longitude depicted districts were selected based on highest concentration of pig farmers. Most of the farmers in the selected regions were tribals and pork consumption was comparably very high among these communities. Surveys for the study purposely targeted farmers who were engaged in pig husbandry for a minimum period of 5 years so as to have proper and reliable response on different variables. A semi-structured interview schedule was administered to 60 randomly selected farmers in each state, thus, making a sample size of 240 farmers.

3. RESULT AND DISCUSSION

3.1 Stages of the adoption process

Decision-making is a process which may be divided into a sequence of stages with a distinct type of activity occurring during each stage[3-4] and[8]. The present study identified five stages of the adoption process, which were awareness, interest, evaluation, trial and adoption. It is evident from Table 01 that cent per cent (100.00%) of the respondents across the four states under study, were aware of 'T&D' pig innovation. The reason for this might be better extension service for the promotion of 'T&D' pig innovation in the study area. A perusal of Table 01 reveals that 75.00 per cent (Jharkhand), 66.70 per cent (West Bengal), 71.70 per cent (Chhattisgarh)

and 63.30 per cent (Bihar) respondents had followed through the interest stage in the adoption process of the 'T&D' pig innovation under the study area. At the trial stage, majority of the respondents of Jharkhand (50.00%) passed through trial in 'T&D' pig innovation, whereas, the respondents of West Bengal (41.70%), Chhattisgarh (30.00%) and Bihar (33.30%) passed through trial stage in adoption of 'T&D' pig innovation under the study area. Same Table 01 shows that majority of the respondents of Jharkhand (80.00%) passed through evaluation stage followed by the respondents of West Bengal (63.30%), Chhattisgarh (60.00%) and Bihar (66.70%) passed through evaluation process in adoption of 'T&D' pig innovation under the study area.

A close examination of Table 01 reveals that majority of the pig farmers of Jharkhand (93.30%) were found in adoption stage of 'T&D' pig innovation. Whereas, most of the pig farmers of West Bengal (88.30%), Chhattisgarh (83.30%) and Bihar (86.70%) were found in adoption stage of 'T&D' pig innovation under the study area. Overall cent-per cent (100.00%) of the pig farmers were aware of 'T&D' pig innovation across the four states under study. Whereas, 69.20 per cent, 38.75 per cent and 65.00 per cent of the respondents passed through interest stage, trial stage and evaluation stage, respectively, under the study area. Most of the pig farmers (87.90%) across the four states under the study were found in adoption stage of 'T&D' pig innovation. The findings of study in line [8-11].

3.2 Awareness to adoption of 'T&D' pig innovation

Distribution of respondents' awareness that convinced them to adopt 'T&D' pig is presented in Table 02. It is revealed from the table that pig farmers (5.00%) of Jharkhand became aware about 'T&D' pig in 1994 and 1995. Majority of pig farmers (18.30%, 21.70% and 25.00%) became aware about the 'T&D' pig in the year 1998, 1999 and 2000, respectively. Pig farmers of Jharkhand reported that they became aware about 'T&D' pig through information received from Birsa Agricultural University, followed by relatives, and neighbour farmers and NGOs working in the study area. Table 02 also indicates that the majority of pig farmers (13.30%, 16.70%, 18.30%, 30.00%) of West Bengal became aware about 'T&D' pig in the year 2003, 2004, 2005 and 2006, respectively. Only 3.3 per cent pig farmers could become aware about the 'T&D' pig innovation in the year 2000, when they obtained information from relatives and Krishi Vigyan Kendra, Bankura. A perusal of Table 02 points out that 1.7 per cent pig farmer of Chhattisgarh first became aware about 'T&D' pig in the year 1999. Majority of the pig farmers (11.70%, 15.00%, 21.70% and 28.30%) became aware about 'T&D' pigs in year 2002, 2003, 2004 and 2005, respectively. They reported that they were convinced by the relatives and 'Holy cross' mission society and neighbouring farmers by providing information about 'T&D' pig innovation. It is indicated in the Table 02 that pig farmers (6.6%) of Bihar first came across information about 'T&D' pig in year 1999. Whereas, the

majority of pig farmers (15.00%, 20.00% and 16.70%) became aware about innovation in the year 2002, 2003 and 2004, respectively. They expressed that they got detailed information about 'T&D' pig from Birsa Agricultural University, commercial pig farmers and NGOs working in the study area. The results finding supported by [7-8].

3.3 Time taken in adoption of 'T&D' pig

There was much difference among the respondents in time they took from awareness to adoption of the 'T&D' pig innovation as shown in Table 03. It is revealed from Table 03 that the majority of pig farmers (20.0%, 30.0%, and 33.30%) of Jharkhand state took one year, two year and three year, respectively to adopt 'T&D' pig innovation. Some farmers took four year (5.00%), five year (3.30%) and six year (1.70%) time from awareness to adoption of 'T&D' pigs in Jharkhand state. Same Table 03 shows that the majority of pig farmers (21.70% and 25.0%) of West Bengal had taken three year and four year time, respectively to adopt 'T&D' pig innovation. Only 10 per cent pig farmers adopted 'T&D' pig within one year of awareness. Further, 15 per cent farmers took time of two years, while, 10.0 per cent, 5.0 per cent and 1.7 per cent pig farmers had taken time of five, six and seven year, respectively to adopt 'T&D' pigs. A perusal of Table 03 shows that majority of pig farmers (28.30%) of Chhattisgarh had taken four year time from awareness to adoption of 'T&D' pigs. Only 5 per cent farmers had taken one year time, 11.7 per cent and 16.7 per cent pig farmers had taken two and three year time, respectively to adopt 'T&D' pig. Further, pig farmers (8.30%, 6.60%, 3.30% and 3.30%) had taken time five, six, seven and eight year, respectively to adopt 'T&D' pigs in the study area of Chhattisgarh. It is indicated in Table 03 that the majority of pig farmers (23.30% and 25.0%) of Bihar had taken time three and four years, respectively to adopt 'T&D' pig. Only 6.7 per cent farmers adopted 'T&D' pig within one year, and remaining farmers (8.30%, 3.30%, 1.70% and 1.70%) had taken five, six, seven and eight year time, respectively in adoption of 'T&D' pig in the study area of Bihar. Overall, only 10.4 per cent pig farmers had taken one year time to adopt the innovation. Pig farmers (18.30%, 23.75%, 20.83%, 7.50%, 4.20%, 1.70% and 1.25%) from all the four states under study had taken time two, three, four, six, seven and eight years, respectively to adopt 'T&D' pig innovation. The finding of results in line [10-11]

3.4 Time-lag in adoption of 'T&D' pig innovation

Time-lag in adoption has been reported to vary from innovation to innovation and this generalization appeared to work in case of 'T&D' pig innovation too as given in Table 04. A perusal of table revealed that only 3.3 per cent of 'T&D' pig adopter farmers of Jharkhand adopted it in the first year of its introduction in social system, whereas, majority of pig farmers (33.30%) had adopted 'T&D' pig in the fourth year of its first awareness. However, pig farmers (15.0%, 30.0%, 8.30% and 3.30%) had adopted 'T&D' pig by second, third, fifth and sixth year, respectively, of time lag of its introduction

in the social system. Same Table 51 shows that the majority of pig farmers (21.60% and 28.30%) of West Bengal had adopted 'T&D' pig by third and fourth year of its introduction in the social system. Only 5.0 per cent farmers adopted it in the first year of its introduction in social system, whereas, 16.7 per cent farmers adopted 'T&D' pig in second year of its introduction. Further, farmers (5.00%, 3.30%, 5.0%, 1.70% and 1.70%) adopted 'T&D' pig in fifth, six, seven and eight year, respectively after its introduction in social system. Table 04 revealed that the majority of pig farmers (23.30% and 26.70%) of Chhattisgarh had adopted 'T&D' pig in the third and fourth year, respectively after the introduction in social system. Only 3.3 per cent farmers had adopted 'T&D' pig in the first year of its introduction in the social system. Farmers (16.70%, 6.60%, 3.30%, 1.70% and 1.70%) of Chhattisgarh had adopted 'T&D' in the second, fifth, sixth, seven and eight year, respectively after introduction of 'T&D' pig in the social system. Further, Table 04 points out that only 5 per cent farmers of Bihar had adopted 'T&D' pig in the first year of its introduction in the social system. Whereas, the farmers (13.30%, 21.60%, 28.30%, 6.60%, 5.0%, 3.30%, 1.70% and 1.70%) of Bihar had adopted 'T&D' pig, respectively in the second, third, fourth, fifth, sixth, seven, eight and nine year of its introduction in the social system. Overall, majority of the pig farmers (29.20%) across all the four states under study adopted 'T&D' pig in the fourth year of its introduction in the social system. This shows that there was adequate time lag in adoption of 'T&D' pig innovation. Whereas, the pig farmers of Jharkhand were characterized as having lesser time lag than in other three states in study with respects to adoption of 'T&D' pig innovation [11]. It could be due to the fact that the 'T&D' pig was developed in Jharkhand state and it was having large number of consumers of pork and predominant tribal population which had traditional liking for the black colour pig [12].

3.5 The S-shaped curve and adoption of 'T&D' pig innovation

The time element of the diffusion process allows to classify adopter categories and to draw diffusion curve [8]. The adoption of 'T&D' pig innovation follows a normal, bell-shaped curve when plotted over time on a frequency basis. The cumulative number of 'T&D' pig adopters when plotted, resulted in an S-shaped curve. Result shows that the rate of adoption for the 'T&D' pig innovation was represented by bell-shaped curve (frequency) and a S-shaped curve (cumulative). The S-shaped adopter distribution rised slowly at first when there were only a few adopters in each time period. The curve then accelerated to a maximum until half of the farmers in the system had adopted 'T&D' pig. Then it increased at a gradually slower rate as fewer and fewer remaining farmers adopted the innovation [11]. Data presented in Table 05 reveals that 6.60 per cent pig farmers of Jharkhand state adopted 'T&D' pig during the year 1994 to 1996, then rate of adoption increased between the years 1997 to 1999, whereas, rate of adoption was maximum in year between 2000

to 2002. The rate of adoption increased at a gradually slower rate between the years 2003 to 2005. Same Table 05 indicates that 10.00 per cent pig farmers of West Bengal adopted 'T&D' pig innovation during 2001 to 2003. The maximum adoption was observed between the years 2005 to 2007, then rate of adoption increased gradually at slower rate during the years 2008 to 2010. Table 05 points out 8.3 per cent pig farmers of Chhattisgarh adopted 'T&D' pig in the years between 1999 to 2001. However, high rate of adoption (11.70%, 16.70% and 11.70%) was observed during 2004 to 2006. A close examination of Table 05 shows that 6.6 per cent pig farmers of Bihar adopted 'T&D' pig during the time period of 2000 to 2001, whereas, maximum number of pig farmers (11.70%, 18.30%, 11.70%, 8.3%) adopted 'T&D' pig in the years between 2004 to 2007, then adoption increased gradually at slower rate [10-11].

4. CONCLUSIONS

The T&D pigs witnessed rapid acceptability among the farmers across all the states under the study, since most of the pig farmers (87.90%) were found in adoption stage of 'T&D' pig innovation. Awareness that convinced to adopt 'T&D' pig was first perceived in 1994 and majority of the farmers became aware about 'T&D' pig innovation during the years between 2000 to 2005. In three years time, the majority of the farmers could adopt 'T&D' pig innovation. While 10 per cent adopted T&D pigs within a year of their first awareness of it.

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Table 01": Stages passed in process of adoption of 'T&D' pig innovation

Stages	Jharkhand		West Bengal		Chhattisgarh		Bihar		Pooled	
	f	%	f	%	f	%	f	%	f	%
Awareness	60	100	60	100	60	100	60	100	240	100
Interest	45	75.00	40	66.70	43	71.70	38	63.30	166	69.20
Trial	30	50.00	25	41.70	18	30.00	20	33.30	93	38.75
Evaluation	42	70.00	38	63.30	36	60.00	40	66.70	156	65.00
Adoption	56	93.30	53	88.30	50	83.30	52	86.70	211	87.90

Figures in parenthesis indicate percentage

Table 02: Stages passed in process of adoption of 'T&D' pig innovation

Year of Awareness	Jharkhand		West Bengal		Chhattisgarh		Bihar		Pooled	
	f	%	f	%	f	%	f	%	f	%
1994	03	05.00							03	01.25
1995	03	05.00							03	01.25
1996	06	10.00							06	02.50
1997	09	15.00							09	03.75
1998	11	18.30			01	01.70	04	06.60	11	04.60
1999	13	21.70	02	03.30	03	05.00	05	08.30	18	07.50
2000	15	25.00	03	05.00	04	06.60	07	11.70	26	10.80
2001			06	10.00	07	11.70	09	15.00	14	05.80
2002			08	13.30	09	15.00	12	20.00	22	09.20
2003			10	16.70	13	21.70	10	16.70	29	12.10
2004			11	18.30	17	28.30	03	05.00	33	13.75
2005			18	30.00	03	05.00	10	16.70	31	12.90
2006			02	03.30	03	05.00			31	12.90
2007									05	02.10
2008										
2009										
2010										
2011										

Figures in parenthesis indicate percentage

Table 03: Time taken from awareness to adoption of 'T&D' pig innovation

Years	Jharkhand	West Bengal	Chhattisgarh	Bihar	Pooled
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	f	%	f	%	f	%	f	%	f	%
One	12	20.00	06	10.00	03	05.00	04	06.70	25	10.40
Two	18	30.00	09	15.00	07	11.70	10	16.70	44	18.30
Three	20	33.30	13	21.70	10	16.70	14	23.30	57	23.75
Four	03	05.00	15	25.00	17	28.30	15	25.00	50	20.80
Five	02	03.30	06	10.00	05	08.30	05	08.30	18	07.50
Six	01	01.70	03	05.00	04	06.60	02	03.30	10	04.20
Seven			01	01.70	02	03.30	01	01.70	04	01.70
Eight					02	03.30	01	01.70	03	01.25

Figures in parenthesis indicate percent

Table 04: Time –Lag in adoption of 'T&D' pig innovation

Time taken (in Years)	Jharkhand		West Bengal		Chhattisgarh		Bihar		Pooled	
	f	%	f	%	f	%	f	%	f	%
1st year	02	03.30	03	05.00	02	03.30	03	05.00	10	04.20
2nd year	09	15.00	10	16.70	10	16.70	08	13.30	37	15.40
3rd year	18	30.00	13	21.60	14	23.30	13	21.60	58	24.20
4th year	20	33.30	17	28.30	16	26.70	17	28.30	70	29.20
5th year	05	08.30	03	05.00	04	06.60	04	06.60	16	06.60
6th year	02	03.30	02	03.30	02	03.30	03	05.00	09	03.75
7th year			03	05.00	01	01.70	02	03.30	06	02.50
8th year			01	01.70	01	01.70	01	01.70	03	01.25
9th year			01	01.70			01	01.70	02	00.80

Figures in parenthesis indicate percentage

Table 05: Year of adoption of 'T&D' pig innovation

Adoption Year	Jharkhand		West Bengal		Chhattisgarh		Bihar		Pooled		Cumulative Number
	f	%	f	%	f	%	f	%	f	%	
1994	01	01.70							01	00.42	01
1995	01	01.70							01	00.42	02
1996	02	03.30							02	00.83	04
1997	03	05.00							03	01.25	07
1998	04	06.70							04	01.70	11
1999	06	10.00			01	01.70			07	2.90	18
2000	09	15.00			02	03.30	02	03.30	13	05.40	31
2001	12	20.00	01	01.70	02	03.30	02	03.30	17	07.10	48
2002	08	13.30	02	03.30	04	06.70	04	06.70	18	07.50	66
2003	06	10.00	03	05.00	05	08.30	06	10.00	20	08.30	86
2004	03	05.00	06	10.00	07	11.70	07	11.70	23	09.60	109
2005	01	01.70	08	13.30	10	16.7	11	18.30	30	12.50	139
2006			14	23.30	07	11.70	07	11.70	28	11.70	167
2007			07	11.70	06	10.00	05	08.30	18	07.50	185
2008			05	08.30	04	06.70	04	06.70	13	05.40	198
2009			04	06.70	02	03.30	03	05.00	09	03.75	207
2010			03	05.00			01	01.70	04	01.70	211
2011											

Figures in parenthesis indicate percentage

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