FINAL TECHNICAL REPORT

Dissemination of animal health knowledge for development of landless dairy cattle owners in the peri-urban regions of Pondicherry, India

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Executive Summary

Cattle being an (the) asset for the landless cattle owners (fetching daily cash income and overall security to the livelihoods), any disease or condition that affects its health has its bearing on the livelihoods of these families. The improvement in the health of the cattle goes a long way in exploiting their production potential helping cattle owners in coming out of the poverty. Knowledge dissemination has a pivotal role in addressing the poverty issues – it requires better understanding and application. Lack of information on animal health practices (ignorance, one of the prime constraints of development) ultimately results in production losses through morbidity and sometimes mortality - all resulting in economic losses to the livestock owners. The cattle owners, who are poor, are apprehensive even to approach centres of knowledge for want of confidence and awareness. The information systems of the cattle owners are to be realistically understood to address the priorities of information on animal health knowledge. The main purpose of the study was to identify the important diseases affecting cattle (and there by the livelihood of the poor), design appropriate dissemination methods to deliver information on these diseases to the cattle owners and to evaluate these methods. The Project also studied the impact of these methods on the knowledge change of the peri-urban landless cattle owners. To achieve the above set objectives 23 peri-urban regions were identified in three peri-urban zones of Pondicherry.

Participatory meetings with different stakeholders were organised to identify the important diseases/conditions affecting the cattle in peri-urban regions of Pondicherry.

A survey was carried out among 891 cattle owners in the identified peri-urban regions to understand the cattle health information systems, which consists of three important subsystems i) the cattle owners, ii) the information sources used by the cattle owners and iii) the knowledge possessed by the cattle owners on the common cattle diseases/conditions. The survey revealed low knowledge levels of the cattle owners on various cattle diseases and conditions.

Different Extension methods like the three-day short-term training courses, need-based folders, farmer-friendly touch screen Information kiosk, and combination of these methods (simultaneous delivery pathways) were used for knowledge dissemination. All these together were mentioned as the Animal Health Knowledge Kit (AHKK). The knowledge of the cattle owners exposed to these delivery methods, showed significant improvement. The Touch Screen Information kiosk installed in Veterinary institutions was an example of Information and Communication Technology that could benefit the poor and illiterate. The research also helped in developing a model in information management on the stages of the kiosk usage after exposure to information kiosk. The kiosk as well as the training proved to be better empowerment methods, in addition to their capacity in raising the knowledge levels of cattle owners.

The majority of people who bring their animals to the Veterinary centres are the poor: 92% of the people (of 933 cattle owners) who had viewed kiosks at the Veterinary centres are landless. For them information from the kiosk is accessible, authentic, pro-active and pro-adoptive. Being located in a veterinary centre, they could turn round for delivery of technical services from the same centre such as additional information and inputs like medicines which will have a useful ending. Improved

knowledge should be facilitated to be translated into adoption by better delivery of services. Dissemination methods independent of veterinary personnel will have better knowledge transfer efficiency in these centres, considering the fact that these personnel have inadequate time for knowledge dissemination.

The farmers and Veterinarian have mentioned that they find that these demand-led deliveries help in preventing diseases and improving health of animals, saving time, labour and money for this disadvantaged group.

Better adoption practices included steps in clean milk production especially washing of udder with dilute potassium permanganate solution and washing of hands by the milker.

A cattle health kiosk, by exposing it to the pro-poor to the world of knowledge, acts as an avenue for opening the world of opportunities for livelihood developments.

The presence of kiosk also helps in empowering the cattle owners.

Under the project an expert committee was constituted to look into the cases of repeat breeding among cattle which was identified as the most important condition affecting the livelihood especially of the landless.

The project has taken special care in seeing that the research – policy interface is strengthened for useful uptake of research findings by ensuring the presence of policy makers in the workshops. The policy makers are thus made aware of the significance of the problem(s), research findings and their relevance. This helps in the effective translation of research findings into appropriate policies benefiting the cattle owners.

The letters obtained from the Secretaries and heads of target institutions demanding information about the project and its outputs serves as a strong indicator of the usefulness of the outputs of the project and their potential uptake.

The project has brought out proceedings of two workshops, one training manual, five folders and five reports. Another training manual on cattle health for farmers, 10 posters and five folders are under final stages of preparation.

Background

Various studies conducted in Pondicherry (Sastry *et al* 1993; Ramkumar and Rao 2001; Butchaiah *et al* 2001) and elsewhere revealed the importance of cattle rearing and the significance of cattle in the livelihoods of the people who rear them. It was also highlighted that the productivity of livestock owned by poor farmers needs to be improved to enable them to move out of poverty. One important way of doing this was by addressing the information needs of the cattle owners.

Dissemination of knowledge through appropriate delivery methods played an important part in addressing these needs. Although telecommunication has made rapid progress, the fruits of it are yet to percolate to the resource poor livestock owners. The challenge is to make the communication revolution, work in the interests of poor.

The preliminary studies reveal that the poor landless livestock keepers do not possess knowledge on many aspects of livestock rearing especially on animal health. Exposure to, and use of appropriate information by these poor people will help them to improve their knowledge enabling them to get more output from their livestock, thus helping them to move out of poverty.

Thus there is an urgent need to understand the dynamics of 'information' as an important resource for the livestock dependent livelihoods. This will have more practical value when studied in a systems approach and hence the methodology of "Information System's approach" (Ramkumar and Rolls, 1995). Available information on Animal Health Knowledge (AHK) need to be efficiently disseminated and delivered to the end users for better production from livestock.

It was contemplated through this study to develop a methodology for the effective utilisation of information on AHK within a systems perspective including the Simultaneous delivery Pathways. The tested extension delivery methods will help in better dissemination and utilisation of information, improving the health and production of the cattle on which the cattle owners depend for their livelihood.

Project Purpose

The purpose of the study was to identify important diseases affecting cattle of the landless (and thereby the livelihood of these poor), design appropriate dissemination methods to deliver information on these diseases to the cattle owners and to evaluate these methods. The project also studied the impact of these methods on the knowledge change among the peri-urban landless cattle owners.

To achieve the purpose,

1. the first priority was to define and identify the peri-urban cattle rearing areas
2. the diseases were identified through participatory meetings with different stakeholders
3. the knowledge levels of the landless cattle owners on these diseases and the important information sources used by them were assessed through a survey
4. need-based, farmer-usable knowledge dissemination methods were identified to constitute the AHKK
5. the methods were designed, delivered and disseminated considering the constraints that are faced by the poor in accessing and understanding the knowledge.
6. the knowledge levels were assessed after exposure to these methods and the usefulness of these methods for the poor were analysed with their participation.

Research Activities

1. Stake Holders Meetings

Three stakeholders meetings were organised to understand their perceptions on the important diseases affecting cattle in the peri-urban regions.

Particulars of the stakeholders meetings

Sl.No	Stake Holders	Peri urban Region	Type of meeting
1.	Milker / Vendor	Thengaithittu	Participatory group meetings
2.	Cattle owners	Thengaithittu	Participatory group meetings
3.	Veterinarians	Representing various organisations in the Government of Pondicherry.*	Workshop

** Department of Animal Husbandry and Animal Welfare, PONLAIT, Co-operative Department, Lead Bank.*

As the number of veterinarians in the selected peri-urban regions are very few, veterinarians working in other areas were also included. In addition the perceptions of veterinarians are vital in the policy making decisions on animal health care.

The Department of Veterinary and Animal Husbandry Extension organised all the three stakeholder meetings. The project leader, Indian Collaborators and the research workers acted as facilitators and the meeting was moderated by the Retired Project Director of the Animal Disease Monitoring and Surveillance (PD- ADMAS) of the Govt. of India.

The main objective of the stakeholders meeting was to arrive at the important diseases as perceived by the relevant stakeholders in the peri-urban regions of Pondicherry. Through the stakeholder meetings, the important diseases or conditions, which affect the cattle, were identified and prioritised. The diseases or conditions identified were *Repeat breeding, Abortion, Mastitis, Bloat, Diarrhoea, Deworming, Tick infestation and FMD*. Based on the perceptions on disease incidence and its relative economic importance, three diseases viz. reproductive disorders (Repeat breeding), mastitis and worm infections of cattle were identified as important conditions at all operational levels (viz state, community and household levels) of the stakeholders. It was important to provide information on these diseases/conditions to the cattle owners. This investment in the form of demand-driven information intervention helps the cattle owners in taking appropriate decisions on preventive and curative measures thereby reducing the incidence of diseases among cattle; this mitigates the concomitant economic losses.

2. Survey

One of the major objectives was to identify all the landless cattle owners in the peri-urban regions of Pondicherry.

A pilot survey among 82 landless cattle owners was conducted. Based on this survey, the interview schedule with 112 items was finalised in consultation with the UK collaborators. The field survey for collecting information on cattle health information system of the peri-urban cattle owners was carried out by eight enumerators over a period of one and half months.

A total of 891 landless peri-urban cattle owners were interviewed to elicit data on farm and farmer characteristics, their information systems and the knowledge they possessed on identified diseases. Dr. Claire Heffernan was in Pondicherry to contribute to the finalisation of interview schedule and had detailed discussions with the field workers on the importance and methods of collecting data from livestock farmers. PRA with focus group discussion and personal meetings were also used for gleaning the data required at different stages.

3. Workshop

Workshop on "Cattle health issues in the peri-urban regions: Potentials of information in coping with Poverty" was organised on 20th and 21st March 2003, at RAGACOVAS. There were 45 participants who attended the workshop from different organisations. The invited papers focused mainly on the important diseases of cattle and various extension approaches, which have serious livelihood implications especially for the poor to prevent and treat the diseases. The workshop proceedings were published as a report containing the papers presented on the workshop. Prof. Chris Garforth participated in the Workshop, presented a paper and chaired two technical sessions.

The papers published in the reports are

1. Animal Health Programmes in India
- Miss Nita Chowdhury
2. Importance of information on diseases of cattle for the poor
- **Dr. C. Natarajan**
3. Cattle rearing by the landless in the peri-urban regions of Pondicherry -Overview
- **Dr. S. Ramkumar**
4. Management of Knowledge and Information for Improved Animal Health
- **Prof. Chris Garforth**
5. Healthcare Extension for Peri-Urban Dairy Farmers: some thoughts
- Dr. N.S.R. Sastry
6. Cattle health issues: a banker's perspective
- Dr. B. Sethuraman
7. Delivery of Veterinary Services to the poor: findings from Pondicherry
- **Mr. Florian Urmetzer**
8. Common Diseases of Cattle in Karnataka and their Impact on the Poor
- **Dr. P.V. Srinivasan**
9. Common Diseases of Cattle in Kerala and their Impact on the Poor
- **Dr. K. Udayavarman**
10. Diseases Affecting Cattle – Importance of information
- Dr.T.P.Sethumadhavan
11. Prevalence of microbial diseases in peri-urban cattle of Tamil Nadu
- Dr. S. Sankaralingam
12. Status Report on Various Diseases encountered in the Union Territory of Pondicherry
- Dr. Alfred Gnanou
13. Addressing Livestock Health Issues for Poor Farmers - Some Experiences from ANTHRA
- Dr. Nitya Ghotge
14. Cattle Insurance – Role in Socio – Economic Development of Milk Production
- Mrs. G. Jayantimala

4. Case studies on cattle feeding schedule

Case studies were conducted in Thengaithittu, one of the peri-urban regions of Pondicherry. Information was collected with respect to the commonly used cattle feed ingredients in the region and the local units of measurement used by the cattle owners. In the first step the terminologies of units of measurement for the various cattle feed ingredients used by the cattle owners were identified. The feed ingredients were weighed in a weighing machine to get the accurate equivalence of the "local feed unit" of the farmer, in the SI system. The frequency of purchase and usual purchase pattern of cattle feeds by the cattle owners were ascertained. This information from the cattle owners was cross-checked with the information gathered from the retail grocery shop.

In the second step, four case studies were conducted among the cattle owners, to ascertain the ration they are providing to the milking cows. After collecting these details the farmer's ration was compared with scientist formulated ration and suggestions were given to improve the farmer's ration. This study was presented as a paper "*Improvising the farmer-formulated ration: problems and prospects.*" This paper formed the basis for the "Dairy Farmers-Scientists Interactive Workshop on Animal Nutrition Issues" organised jointly by the "Animal Nutrition Society of India" and " RAGACOVAS" at Pondicherry on 8th and 9th October 2003.

5. Consultancy on Repeat breeding

The findings of the Stakeholders meetings, 'State level Veterinarians workshop' and the survey showed that Repeat breeding is a major problem faced by the landless cattle owners of peri-urban regions of Pondicherry. Hence a three member expert committee consisting Dr. N.S.R. Sastry (a livestock development specialist), Dr. N. Kandasamy, Professor of Animal Genetics and Breeding and Dr. C. Chandrahasan Professor of Animal Reproduction and Gynaecology from the Tamil Nadu Veterinary and Animal Sciences University was constituted to conduct a rapid appraisal study on the causes for repeat breeding in crossbred cattle in Pondicherry region and possible solutions to address this problem. The committee visited the farm and the cattle owners in their place and enquired about their problems especially about repeat breeding and also visited Veterinary Dispensaries and Key Village Units and had discussions with VFAs and VASs. Also a veterinarians meet was conducted and details and opinions about repeat breeding were collected through a questionnaire designed exclusively for this purpose. Based on these discussions and meetings the committee submitted a report on Repeat breeding in cattle. A copy of the report was also submitted to the Department of Animal Husbandry and Animal Welfare, Government of Pondicherry for its use.

6. Short-Term Training Programme

Three days training programme on "Scientific rearing of dairy cattle" was organised for 92 landless cattle owners (in 4 batches) of the peri-urban regions, Thengaithittu, Manaveli and Ariyankuppam of Pondicherry. The training content includes "Dairy cattle breeding and selection of cow, cattle management, feeding, health care, reproduction and fodder production" which were dealt by the subject experts from the college. Pre and post knowledge levels of the cattle owners who attended the training continuously for all the three days were assessed through a knowledge test. The results revealed a significant difference in the pre and post knowledge scores of

the participants of the training. This improved knowledge score is expected to reflect upon better rearing of cattle, resulting in better health care of cattle and ultimately in reducing their vulnerability to poverty. The training manuals in local language were distributed among the cattle owners, which serve as "permanent reference materials" for them.

7. Design, distribution and evaluation of need-driven Folders

The three important stages in the preparation of need driven folders are:

1. Text preparation, modifying it into language, which is 'farmer understandable' and 'farmer appreciable.'
2. Graphic designing with meaningful illustrations for the farmers.
3. Printing.

Five folders with captions of Repeat Breeding, FMD, About RAGACOVAS, Cattle insurance and Schemes of the Animal Husbandry Department, Government of Pondicherry were designed and printed in vernacular language (Tamil) based on the demand driven information. The folders were distributed to the landless cattle owners of peri-urban regions of Pondicherry through important potential dissemination points like veterinary dispensaries, Key Village Units, veterinary teaching hospital, milk co-operative societies, NGOs, important stake holders like milkers, milk vendors and others. Before giving the folders pre knowledge scores were recorded. After a period of 15 days post knowledge scores were recorded. A marked improvement in the knowledge scores was noticed among the cattle owners.

8. Farmer-friendly touch screen Information Kiosk

The information kiosk has two major parts in its synthesis:

1. the hardware part (computer) and the interactive touch screen
2. the software (touch Screen Programme which had text and pictures with sound back- up)

The text was prepared by the project team and verified its correctness by the Faculty of Clinical Medicine, Preventive Medicine, Animal Reproduction, Gynaecology and Obstetrics of RAGACOVAS, Pondicherry. Different graphics (Pictures, photographs and animations) were added appropriately to the text. The sound back-up in local language that would benefit the illiterate cattle owners was also added.

The information kiosk was installed in two places one at Key Village Unit, Thengaithittu and the other at Veterinary Dispensary, Villianur. A cattle health kiosk not only exposes the pro-poor to the world of knowledge but also acts as a window to the world of opportunities for livelihood developments. The study revealed that over a period of 5 months, 933 cattle owners have used the kiosk, of which 92% were landless. This highlights the point that majority of the people who bring their animals to the Veterinary centre are the poor. For them information from the kiosk is authentic and pro-active since it stands in a veterinary institution and they could turn for delivery in the same centre.

The presence of the kiosk, in addition to its role on knowledge dissemination, also helps to empower the cattle owners. It helps them in demanding deliveries (as prescription, medicines or further information) from the personnel in Veterinary centres. These deliveries help in preventing diseases and improving health of animals, saving time, labour and money for this pro-poor category of cattle owners.

The Veterinarian in the Dispensary has mentioned about the improved knowledge of the cattle owners on cattle health, which is reflected in presenting the animals affected by diseases at an early stage and demanding examination of sick cattle. The farmers have mentioned that they are seeing improvement in the health of the cattle (e.g. less cases of mastitis, repeat breeding and tick infestations) after utilsing the information accessed from the kiosk and other extension media. The multiplier effect of information dissemination from the kiosk user to his/her friends is yet to be studied.

Accessible information on cattle health through kiosks builds up confidence among the poor cattle owners. By familiarising with the kiosks they mention that they get confidence in approaching other centres for help.

9. Simultaneous extension delivery pathways

Selected landless cattle owners were also exposed to the combination of above said extension delivery methods on cattle health knowledge. The combinations tested were

a) Cattle owners exposed to folder and then kiosk.
b) Cattle owners exposed to training and then folders.
c) A combination exposed to kiosk, training and folders.

10. Evaluation of different extension delivery methods

After exposing the landless cattle owners to different extension methods - short-term training programme, information kiosk, folders and their combinations, the knowledge levels of the cattle owners were measured using a structured interview schedule. The knowledge scores of the cattle owners after exposure to the various methods were calculated and compared with the baseline knowledge scores (calculated in the I year). This was an experimental approach in which pre and post knowledge scores were compared with those of the control group except training. In evaluation of the short term training the pre and post knowledge scores of the trainees were compared. The scores revealed a significant change in knowledge of landless cattle owners exposed to various extension methods. The findings were presented in the workshop "Dissemination of Animal Health Knowledge" at Pondicherry.

11. Workshop

A workshop on "Dissemination of Animal Health Knowledge" was organised on 11th and 12th March, 2004 at RAGACOVAS. Forty participants representing various organisations, which include Departments of Animal Husbandry, State Agricultural Universities, institutes of Indian Council of Agricultural Research (ICAR), Milk Unions, and Non Government Organisations from different states of India and UK participated in the workshop. Prof. Chris Garforth and Dr. Claire Heffernan presented papers in the Workshop and chaired technical sessions.

The papers presented in the workshop were:

1. Experiences on the use of different Extension Delivery Methods among the Livestock Farmers in Karnataka	*Dr. G.M. Kalleshwarappa*
2. Expert systems – IT enabled Extension Delivery System	*Dr. D. Thammi Raju and Dr. B. Sudhakar Rao*
3. Dissemination of Livestock Health Knowledge through Cyber Extension	*Dr. P.V.K. Sasidhar and Dr. V.P. Sharma*
4. Pattern of Knowledge Disseminating Strategies in the field of Veterinary and Animal Husbandry practices for Rural Development	*Dr. H.K. Verma, Dr. K.B. Singh and Dr. S.K. Kansal*
5. Dissemination of Project activities and outputs	*Dr. S. Ramkumar*
6. Effectiveness of different Knowledge Dissemination Methods used in the project	*Dr. S. V. N. Rao*
7. Knowledge Transfer and Livestock Development	*Dr. Claire Heffernan*
8. Understanding the Link between Knowledge and Practice	*Prof. Chris Garforth*
9. Dissemination of Animal Health Knowledge - A Working Model in Andhra Pradesh	*Dr. P. Venkataramaiah*
10. Application of Information and Communication Technology in Animal Husbandry and Dairying	*Mr. A.P. Ruhil, Dr. Khazan Singh and Dr. D.K. Jain*
11. Experiences in the use of Extension Delivery methods for Livestock Development in Kerala	*Dr. M.R. Subhadra*
12. ICTs for Development of Rural communities	*Dr. A.P. Thiagarajane*
13. Strategies for Dissemination of Knowledge of Animal Health Management Practices among Cattle Owners under IRD project focused on Dairying in U.P.	*Dr. Ritu Chakravarty, Dr. Ram Chand, Dr. S.Chinnadurai, Dr. A.K. Chakravarty. Dr. Khajan Singh, Dr. Omvir Singh and Dr. Parveen Kumar*
14. Dissemination of Animal Health Knowledge to Rural Milk Producers in Krishna District of Andhra Pradesh	*Dr. T. Babu Rao*

12. Television Programme

As the survey conducted among the peri-rban landless cattle owners in Pondicherry revealed that Television was owned by majority (78%) of the peri-rban landless cattle owners, it was thought appropriate to use it as one of the media to disseminate cattle health knowledge. ence a Television programme on '*Repeat breeding*' has been shot in collaboration with Doordarshan, Pondicherry and will be telecast on "Doordarshan," a Government channel of India.

13. Consultancy visit

Dr. M.L. Madan, Ex Vice-Chancellor and former Deputy Director General (Animal Sciences), Indian Council of Agricultural Research delivered a guest lecture on the "*Livestock and Animal Health Scenario in India*" at RAGACOVAS and discussed with the project leader and Indian collaborators on the future strategies of the project.

14. Dissemination activities

(i) The project leader presented a research paper on "L*andless dairy farming by women in Pondicherry*" at the workshop organised by the Indo Swiss, NMPRO, DANIDA, FAO and the Government of Orissa ("Livestock Services and the poor") on 28th and 29th October 2002. Officials from the above organisations, IFAD and the World Bank participated in the workshop. The workshop gave an opportunity

for dissemination and discussion of the present project among the livestock development personnel.

(ii) The project leader presented a paper on "Information kiosk on dissemination of animal health knowledge" in the workshop on "Rural knowledge centres: Harnessing local knowledge via interactive media", Policy Makers Workshop held at MS Swaminathan Research Foundation, an NGO, in Chennai on 8th October, 2003.

Outputs

All the anticipated outputs were achieved. Although the cattle disease map was plotted it is yet to be finalised for printing. Five more folders and posters are yet to be printed. This was because of the additional demand from the cattle owners for these knowledge dissemination methods, on themes they felt were important for them. The important results of the research are given below.

Salient results from the survey of the peri-urban landless cattle owners in Pondicherry, India (2002 – 2003)

Table 1: *Sex of the respondents*

Sex	n	%
Male	174	19.5
Female	717	80.5
Total	**891**	**100.0**

Table 2: *Occupation of the respondents*

Occupation	n	%
Only cattle rearing	754	84.6
*Agri. Laborer	35	3.9
*Non- Agri. Laborer	42	4.7
*Other Occupation	60	6.7
Total	**891**	**100.0**

Table 3: *Education of the respondent*

Education	n	%
Illiterate	370	41.4
1-5	212	23.8
6-8	171	19.2
9-10	92	10.3
>10	26	2.9
Read and Write	20	2.2
Total	**891**	**100.0**

Table 4: *Herd Size*

Herd size	n	%
1-3	564	63.3
4-6	243	27.3
7-9	53	6.0
10+	31	3.5
Total	**891**	**100.0**

Mean Herd size: 3.5

Table 5*: Monthly Gross Income (Rs)*

Mean family income (a)	5349
Mean income of the respondent (b)	2836 (53%)*
Mean income of the respondent from dairying ©	2386 (84%)**

* % of a ** % of b

Table 6: *Means of various production parameters of cattle*

Parameters	Quantity (in litres)
Milk production / milking cow	5.00
Milk consumption / household	0.77
Milk sales / household	5.22
Percapita consumption of milk	0.16

Table 7: *Amount spent on food / Household / day by cattle owners*

Amount on food (Rs.)	n	%
Less than 50	440	49.4
50-100	387	43.4
More than 100	64	7.2
Total	**891**	**100.0**

Mean : Rs. 65.47

Table 8*: Respondents' perception on sufficiency of food*

Sufficiency	n	%
Insufficient	89	10.0
Just Sufficient	326	36.6
Sufficient	470	52.7
More than sufficient	6	0.7
Total	**891**	**100.0**

Table 9: *Consumption of eggs*

Eggs	n	%
Consumed	794	89.1
Not consumed	97	10.9
Total	**891**	**100.0**

Mean numbers / person / year (for consumed): 111

Table 10: *Consumption of meat*

Meat	n	%
Consumed	760	85.3
Not consumed	131	14.7
Total	**891**	**100.0**

Mean (grams) / household / week (for consumed): 448.41

Table 11: *Source of information on cattle health*

Sources	n	%
Veterinarian	331	37.1
Veterinary Field Assistant	211	23.7
Neighbours	60	6.7
Milker/Vendor	60	6.7
Other cattle owners	42	4.7
Own family members	27	3.0
Others	25	2.8
Not contacted any source	378	42.4

Table 12: *Frequency of use of information source for cattle health*

Sources/ Frequency	Weekly	Fortnightly	Monthly	Bimonthly	Quarterly	Half-yearly	Yearly	Any time	**Total**
Veterinarian	8	10	50	56	86	94	27	-	**311**
Vety. Field Assistant	2	2	33	30	61	63	20	-	**211**
Neighbours	5	4	15	8	22	3	3	-	**60**
Milker/ Vendor	6	4	21	9	17	2	1	-	**60**
Other cattle owners	4	8	14	5	7	4	-	-	**42**
Own family members	-	2	5	1	3	-	-	16	**27**
Others	4	1	8	-	6	2	3	1	**25**
Total	**29**	**31**	**146**	**109**	**202**	**168**	**54**	**17**	**756**

Not contacted any source (378)

Table 13: *Respondents' perception about information source on cattle health*

Sources/Frequency	Good	Moderately good	Not good	Total
Veterinarian	283	48	-	331
Vet. Field assistant	157	45	9	211
Milker/vendor	51	6	3	60
Other cattle owners	49	11	-	60
Own family members	34	8	-	42
Others	27	-	-	27
Total	**624**	**120**	**12**	**756**
Not contacted any source (378)	23	2	-	25

Table 14: *Sources contacted for treatment of cattle*

Sources contacted	Total
Veterinarian	750
Vet. Field Assistant	467
Quack	18
Milker	12
Others	10
Total	**1257**

Not contacted any source(3)

Table 15: *Respondents' perception on sources contacted for treatment*

Sources contacted/perception	Satisfied	Can't say	Dissatisfied	Total
Veterinarian	735	10	5	750
Vet. Field Assistant	439	9	19	467
Quack	18			18
Milker	12			12
Others	9	1		10
Total	**1213**	**20**	**24**	**1257**

Not contacted any source(3)

Table 16: *Frequency of contact with Veterinary Field Assistant (VFA) for treatment of sick animal in the last one year*

Frequency	Total	%
1-3 times	146	16.4
4-6 times	137	15.4
More than 6 times	92	10.3
Not contacted VFA	516	57.9
Total	**891**	**100.0**

Average: 5.7

Table 17: *Frequency of contact with Veterinarian for treatment of sick animal in the last one year*

Frequency	Total	%
1-3 times	169	19.0
4-6 times	180	20.2
7-12	146	16.4
More than 12 times	108	12.1
Not contacted VS	288	32.3
Total	**891**	**100.0**

Average: 8.2

Salient results on the evaluation of the knowledge dissemination methods (2003-2004)

Table 18: *Methodology for the evaluation of information kiosk in a veterinary institution*

1. Kiosk facilitator's observation
2. Critical reflections of cattle owners' groups
3. Individual user evaluation
   - By cattle owners
   - By Veterinary Assistant Surgeon (VAS)
   - By Veterinary Field Assistant (VFA)
   - And the attender of Veterinary dispensary.

Table 19: *Evaluation report as on 28-01-2004 from the Information kiosk in the Veterinary Dispensary,Villianur.*

Total number of cattle owners who have used the kiosk	:	933
Number of landless cattle owners who have used the kiosk	:	862 (92.39%)
Number of cattle owners who owns land	:	71 (7.60%)
Number of female cattle owners who used the Kiosk	:	395 (42.34%)
Number of male cattle owners who used the Kiosk	:	538 (57.66%)
Average time a livestock owner uses the kiosk	:	15 minutes
Maximum no: of times the Kiosk was used by a single person	:	7 times

Table 20 : *Frequency of use of kiosk as on 28.01.04*

One time users	814
Two-time users	101
Three-time users	11
Four-time users	4
Five-time users	2
Seven-time users	1
Total	**933**

Table 21.1 The screens used most frequently by the cattle owners are as follows:

INFORMATION POOL: 1

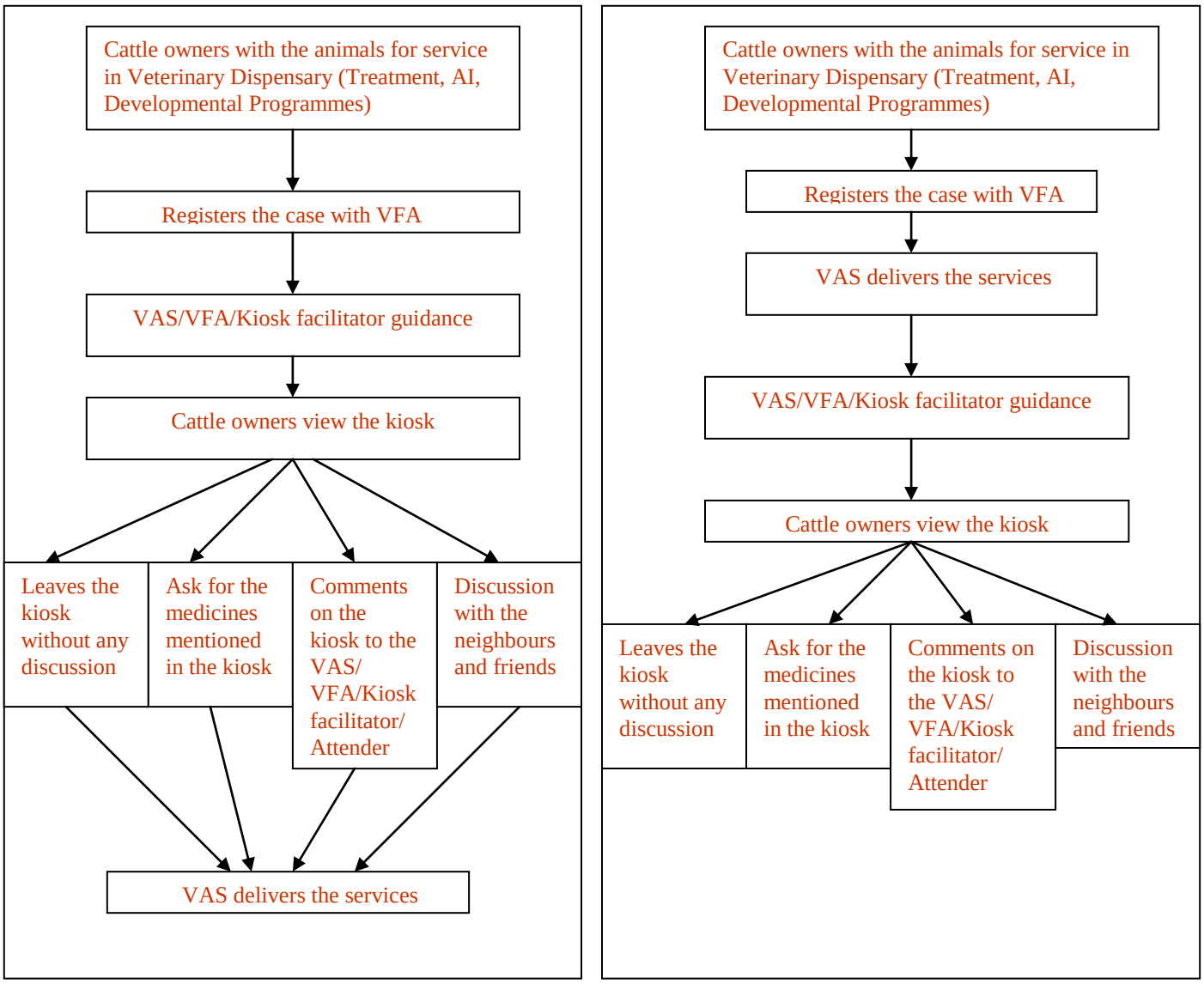
1.	Cattle management	:	301 times
2.	Repeat breeding	:	368 times
3.	Mastitis	:	320 times
4.	Clean milk production	:	338 times
5.	Worm infestation	:	315 times
6.	Calf management	:	305 times

Table 21. 2 The screens used most frequently by the cattle owners are as follows:

INFORMATION POOL: 2

1.	Bloat	:	105 times
2.	Retention of placenta	:	120 times
3.	Abortion	:	80 times
4.	Others (different screens)	:	405 times

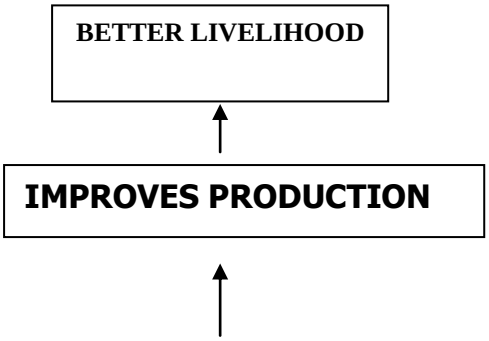
Figure 1 : Viewing the kiosk : The usual paths observed



(VAS: Veterinary Assistant Surgeon, VFA: Veterinary Field Assistant, AI: Artificial Insemination)

Situational analysis *before* and *after* the installation of information kiosk in Villianur Veterinary dispensary

Selected examples of the information–factors affecting cattle health, and the post-information exposure behaviour of the cattle owners . . .



Situation before kiosk installation	Information- factors affecting cattle health	Situation after kiosk installation
1.Cattle owners who visited the VD were unaware of deworming. 2. VAS/ VFA initiated and distributed deworming medicine. 3.Medicines were distributed whenever deworming campaign was conducted. 4.unaware about the deworming schedule of calves.	**1. Deworming at less than 3 months of age**	AWARE: *Cattle owners are aware of deworming. *Realise that symptoms like potbelly and rough coat are due to worm infestation. *Deworming can be done at even less than 3 months of age. DEMAND: *Cattle owners asked for deworming medicines. DELIVERY: *Medicines were distributed to the cattle owners from the dispensary. ADOPTION: *Deworming done at regular intervals. *Following the deworming schedule.

1.Unaware that mineral mixture feeding will help in reducing the problem of repeat breeding. 2. Mineral mixture was supplied in few cases showing symptoms of anoestrum, repeat breeding and under developed genitalia during infertility camp. 3. Unaware that mineral mixture were supplied to cattle owners who registered under the "Elite cow scheme" 4. Farmers were unaware that powders distributed to them were mineral mixture.	**2. Feeding of mineral mixture**	AWARE: *Mineral mixture should be included in daily feeding ration. *Mineral mixture was supplied in dispensary. *Mineral mixture feeding helps in better growth or development of genetalia. DEMAND: *Demand in requesting of mineral mixture. *Amount of mineral mixture to be added in daily ration. DELIVERY: *Purchase of mineral mixture for outside prescription if not registered under "Elite cow scheme". ADOPTION: *Uses mineral mixture in daily ration. OUTCOME: *Mentioned that mineral mixture included feed shows better yielding and reduce the problem of repeat breeding in cattle.
1. Unaware that ticks can cause fever in animals. 2. Unaware that regular deticking should be done. 3. Unaware that unclean shed and crevices in the floor were the breeding places for ticks. 4. Unaware that medicine for ticks is available in the medical shops.	**3. Tick infestation**	AWARE: *Ticks can cause fever in animals. *Tick fever may lead to death of animals if untreated. *Allergy and jaundice may be caused by this blood sucking parasites. DIALOGUE: *Discussed whether one deticking treatment is not enough *Enquired about the directions for the usage of tick medicine. DEMAND: *Demand for the distribution of medicine DELIVERY: *Delivery of deticking medicines as prescriptions. ADOPTION: *Applies deticking medicine at regular intervals *Maintenance of hygienic shed. *Regular grooming of animals.

1.Cattle owners unaware about washing of udder with dilute potassium permanganate solution in cases of mastitis. 2. Unaware that dilute potassium permanganate solution can be used to wash the udder routinely before milking.	**4. Washing of udder with dilute pot. Permanganate solutions**	AWARE: * dilute potassium permanganate solution can be used to wash the udder in case of mastitis. * Regular washing of udder before milking with dilute potassium permanganate solution can reduce the occurrence of mastitis. DIALOGUE: *Enquire whether it is available in the dispensary. *Directions for usage of pot. Permanganate crystals and their dilution. DEMAND: *Demanding potassium permanganate crystals from the dispensary. DELIVERY: *Delivery of pot. permanganate crystals from the dispensary has increased. ADOPTION: Daily usage of dilute pot. permanganate solutions to wash the udder. OUTCOME: Shown that use of dilute pot. Permanganate solution to wash the udder before milking reduces the pox lesions, teat blisters.

1.Unaware that deworming at regular intervals is important to improve the health of animal and this helps in overcoming the problem of repeat breeding. 2. Unaware that the animals should be treated for repeat breeding. 3. Unaware that balanced feeding plays an important role in reducing the occurrence of repeat breeding. 4. Unaware that inseminating the lactating cow will not affect the milk yield. 5. Unaware that the animal should be treated, if not conceiving after 3 inseminations.	**5. Repeat breeding.**	AWARE: * Timely deworming can improve the health of the animal reducing the occurrence of repeat breeding. * Proper balanced feeding may overcome this problem of repeat breeding. * Inseminating the lactating cattle will not affect the milk yield. * Aware that the animals should be treated for repeat breeding if not conceiving after three consecutive inseminations. *Realised that mineral mixture feeding in daily ration will reduce the problem of repeat breeding and improves conception rate. DIALOGUE: Discussing with VAS that symptoms mentioned in the kiosk are seen in their animals. DEMAND: *Demands for treatment if not conceiving after 3 consecutive inseminations

		DELIVERY: *Delivery of service by VAS for examining the animal *Delivery of prescription of mineral mixture. ADOPTION: Bringing their animals for examining for repeat breeding. *Following the practice of including mineral mixture in the daily ration.
1.Unaware that old fermented kitchen wastes fed to the animals can cause bloat. 2. Unaware that the intake of plastic bags while grazing may cause bloat. 3. Unaware that gingelly oil can be drenched for bloat. 4. Unaware that water should not be given in case of bloat. 5. Unaware that bloat may lead to death of animal.	**6. Bloat**	AWARE: * Kitchen wastes and fermented rice gruel fed in large quantities may cause bloat. *Water should not be given, in the condition of bloat. *Gingelly oil can be drenched for bloat. *Eating plastic bags can cause bloat. * Bloat may lead to death of animal if not treated immediately. DIALOGUE: *Discussing with VAS whether drenching of gingelly oil will be effective in case bloat. ADOPTION: *Drenching of gingelly oil for bloat. *Avoid stray feeding /feeding from dustbins. *Avoid over feeding of kitchen wastes to the animals.
1. Unaware that pregnancy diagnosis can be done after 60 days of insemination 2. Unaware that PD before 3 months will not cause abortion. 3.Cattle owners believe that animal could be pregnant by looking at the appearance of the animal. 4. Unaware about the gestational heat and afraid of abortion. 5.Unaware that pregnant animal need special feeding ration.	**7. Pregnancy diagnosis (PD**)	AWARE * PD can be done after 60 days of insemination. * PD less than 3 months will not cause abortion. * Special feeding during pregnancy, which will improve the health status of cattle and calf. DIALOGUE: *Consulting the VAS about the gestational heat. DELIVERY: * Delivery of services by VAS for confirming the PD.

1. Unaware about the balanced ration. 2. Unaware about the feeding management at different stages. (like during lactation, pregnancy, after parturition) 3. Unaware about the importance of green fodder cultivation.	**8. Feeding management**	AWARE: *Known about balanced ration. * The feeding schedule for heifer, dry cow, pregnant cow and lactating cow. *The importance of green fodder cultivation. DIALOGUE: *Cattle owners enquired about the feeding schedule in the kiosk. DEMAND: Demanding for the informations about the feeding schedule for heifer, pregnant, dry cow, lactating and after parturition. DELIVERY: *Delivery of informations about the feeding schedule. *Delivery of information about green cultivation.
1. Unaware about the important steps in the clean milk production. 2. Unaware whether mastitis is curable or not. 3. Belief: • Mastitis is caused by 'drishti' or 'kanneru'. • Eating of placenta by dogs can cause mastitis. 4. Was not able to correlate the symptoms shown to disease of mastitis. 5. Unaware about the right method of milking.	**9. Mastitis**	AWARE: *The important steps in clean milk production. * Mastitis can be cured. * These believe are not right. * Can identify the symptoms of mastitis. *The right way of milking. DEMAND: *Insisting their milkers to follow the right way of milking. ADOPTION: *Following the use of dilute pot.permangnate solution to wash the udder before milking as mentioned in the kiosk.
1. Unaware about the age of maturity of heifer 2. Unaware about the balanced feeding to overcome this problem.	**10.Anoestrum**	AWARE * Age of maturity of heifers at around 16-18 months. * The balanced feeding is essential for early age of maturity.
1.Belief: Hanging the fetal membranes in the trees, secreting milky sap will increase the milk yield of the lactating cow. 2.unaware that the fetal membranes should be disposed properly.	**11.Disposal of placenta.**	AWARE: *Realised that hanging of fetal membranes in the trees will not affect the milk yield. * Fetal membranes should be disposed properly.

- VAS-Veterinary Assistant Surgeon
- VFA-Veterinary Field Assistant
- VD -Veterinary Dispensary

Table :22 Effect of Training on the knowledge levels (n = 48)
(number of respondents who answered correctly)

Knowledge items	Baseline	Pre training	Post training
1. Correct time to inseminate	07 (15)	18 (38)	40 (83)
2. Insemination after calving	07 (15)	24 (50)	39 (81)
3. Shedding placenta	38 (79)	46 (96)	38 (79)
4. Deworming calf first	0 (0)	02 (04)	25 (52)
5. Age at maturity	18 (38)	31 (65)	37 (77)
6. Cause for FMD	03 (06)	10 (21)	16 (33)
7. Cause for Mastitis	03 (06)	08 (17)	13 (27)
8. Zoonotic diseases	0 (0)	02 (04)	18 (38)
9. Vaccination	22 (46)	44 (92)	48 (100)
10. Duration of oestrus cycle	12 (25)	14 (29)	34 (71)

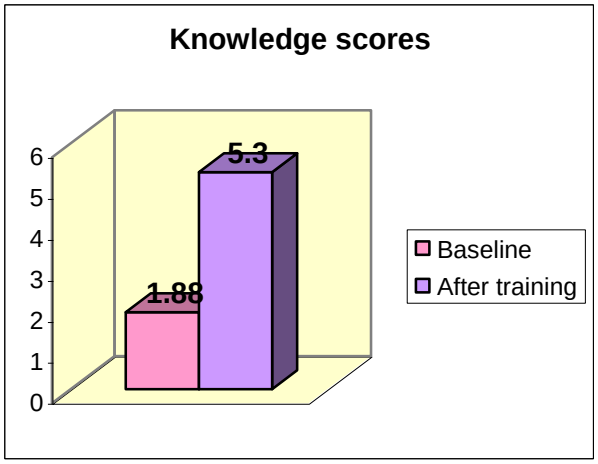
Figures in parentheses indicate percentages to total

Table 23: Effect of Kiosk on the knowledge levels (n = 31)
(number of respondents who answered correctly)

Knowledge items	Baseline	After Exposure to kiosk
1. Correct time to inseminate	9 (29)	23 (74)
2. Insemination after calving	5 (16)	18 (58)
3. Deworming calf first	1 (3)	8 (26)
4. Detect FMD	30 (97)	31 (100)
5. Prevent FMD	12 (39)	27 (87)
6. Shedding Placenta	28 (90)	29 (94)
7. Vaccination	17 (55)	29 (94)
8. Prevent Mastitis	13 (42)	30 (97)
9. Cause for Bloat	15 (48)	20 (65)
10. Disposal of Dead animal	24 (77)	29 (94)

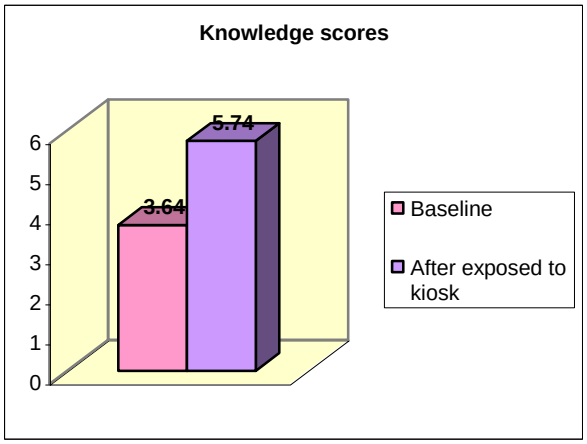
Figures in parentheses indicate percentages to total

Fig 2: *Impact of training on knowledge of landless cattle owners on cattle health*



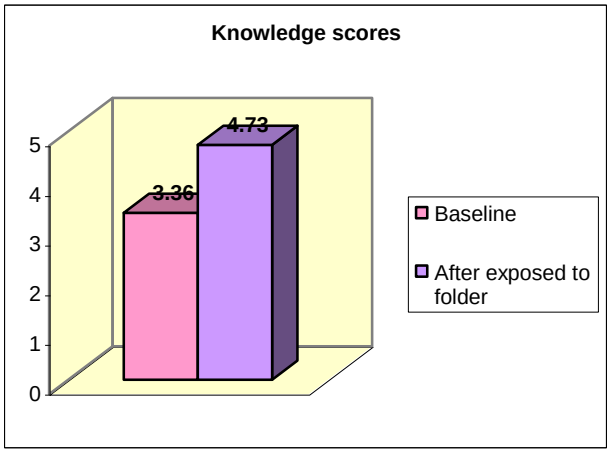
TRAINING

Fig 3: Impact of kiosk on knowledge of landless cattle owners on cattle health



KIOSK

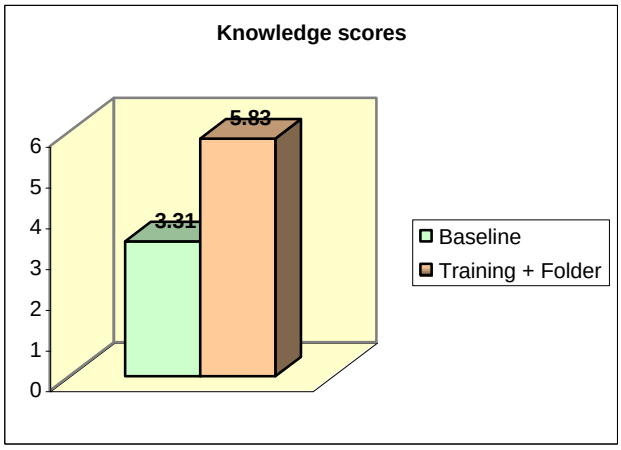
Fig 4 : Impact of folder on knowledge of landless cattle owners on cattle health



FOLDER

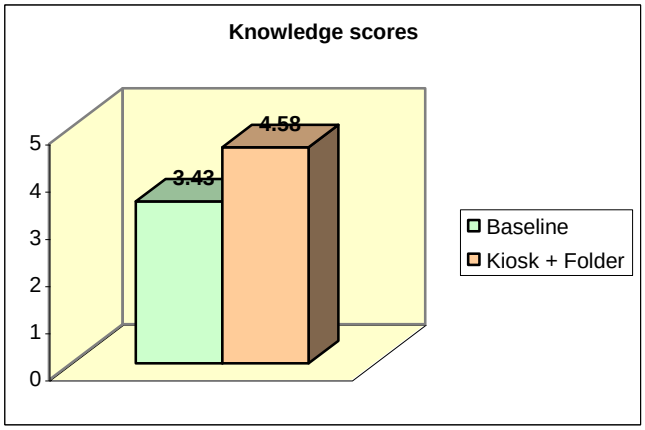
Impact of Simultaneous Delivery Pathways (SDP)

Fig 5: Training and Folder



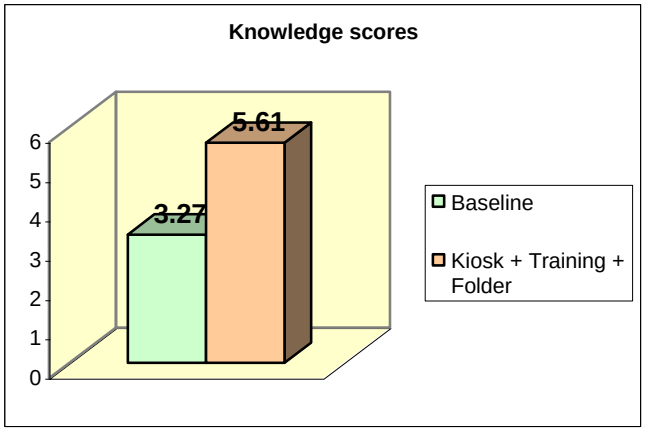
TRAINING AND FOLDER

Fig 6: Kiosk and Folder



KIOSK AND FOLDER

Fig 7 : Kiosk , Training and Folder



KIOSK, TRAINING AND FOLDER

Contribution of Outputs

The identification of cattle health information systems in this project has revealed the importance of professional information system in information transfer for the landless. It also highlighted the low knowledge levels of cattle owners on the important diseases/conditions affecting cattle. Knowledge was thus identified as an important input that could improve the conditions of cattle and thereby help the cattle owners save their time, money and labour, releasing them from the threshold of poverty. The AHKK, which includes short-term training, folders and information kiosk, proved to be useful in disseminating knowledge. The farmers improved their knowledge scores significantly. This not only helped in improving their capacities to manage cattle but also paved the way for empowerment. Capacity building and empowerment had direct effects in improving the quality of life of the landless cattle owners.

The target institutions:

- The Department of Animal Husbandry and Animal Welfare, Government of Pondicherry.
- Animal Husbandry Departments of different States of India.
- Pondicherry Co-operative Milk Producers Union Ltd (PONLAIT).
- M.S. Swaminathan Research Foundation (MSSRF)(NGO).
- Veterinary Teaching Hospital, RAGACOVAS.
- National Institutes: Indian Veterinary Research Institute (IVRI), National Dairy Research Institute (NDRI), National Dairy Development Board (NDDB).

Key 1: DFID Scores for Uptake Pathway:

A Generation of relevant research results

Reports and findings distributed to various departments of Animal Husbandry and Veterinary Institutions in India and other National and International Institutes

B- Formal/informal agreements with target institutions

E- Adoption of products by target institutions

The target institutions are requesting for the CDs prepared on 'cattle health' for information. The participants of the workshop held in March 2004, from different parts of India have seen the functioning of kiosk in the Veterinary Institution and have mentioned their interest in adopting it in their places.

G - Promotion of technology or behavioural change among end-users by target institutions

H- Adoption of technology by end-users and generation of economic benefits i.e. developmental impact

The target institution: The Department of Animal Husbandry and Animal Welfare, Government of Pondicherry
The end-users are benefiting economically by the use of these kiosks.

The folders prepared are being distributed to farmers attending seminars, campaigns and meetings by the RAGACOVAS as well as the Department of Animal Husbandry and Animal Welfare are distributing the folders prepared to farmers attending seminars, campaigns, trainings and meetings. There is a demand for training of cattle owners from Animal Husbandry Department and NGOs.

The information kiosk is being widely appreciated for its efficiency in transferring knowledge to reach the landless cattle owners and its potential to empower the poor. The simple logic of "applicable knowledge" having bearing on reduction of poverty seems to be working out through this "socialistic ICT medium".

The presence of these kiosks in different Veterinary institutions will definitely help in the credible transfer of knowledge to the poor among the cattle owners.

The findings of the research need to be published for the larger benefits and the project team has already identified three major themes (based on this research and associated projects funded by DFID Animal Health Programme) for publication in Journals.

In addition to the target institutions identified in the initial phase of research in 2002, many other institutions have shown interest in understanding and applying the research findings (see the letters enclosed in the Appendix).

a) Further study is needed to understand the adoption of various practices at household levels. This is required to study whether the post-knowledge change among the farmers end up in adoption or not. This needs to be carried out by RAGACOVAS.

b) Further research also is required on the modification of the contents of information kiosk and scope of including more information (with a caution of identifying the point of information over load). This requires interaction with and expertise from ICT personnel with an aptitude for developmental issues.

Impact

L: *Landless or land poor*

affected now : 1000 – 1100 farmers in Pondicherry
Affected after : 15,000 – 20,000 cattle owner in Pondicherry
Other cattle owners' in other states of India and else were

H: *National extension and other technical support services:*

Pondicherry
- Veterinary dispensaries
- Veterinary key village units
- Milk cooperatives
- NGOs

Else were in India

Animal Husbandry departments: The target institutions now serve as better knowledge dissemination centres – with many farmers presenting their cases (animals) at an early stage as they could identify the symptoms of sickness through information kiosks installed at Veterinary Dispensary (VD) and Key Village Unit (KVU).

The Veterinarian of VD where kiosk is installed mentioned in his feedback that the cattle owners are now demanding for deworming medicines for cattle, Potassium permanganate crystals for making dilute solutions for udder wash, mineral mixture to be supplemented and for better services. (Please see figure 2, which is a model from this study that describes how efficient demand delivery is made possible through knowledge dissemination).

I: NGO's: Animal health knowledge kit forms an important component of the overall information especially of MS Swaminathan Research Foundation. The World Summit for Information Society was organised by the UN in Geneva from 9 to 12 December 2003 on the theme of ICTs for rural development. T he MS Swaminathan Research Foundation- MSSRF (an NGO) from India also participated in this. As a part of the One Word International, London there was an Open Knowledge Network Stall showcasing various ICT projects. The Case of DFID AHP supported information kiosk and its use to the cattle owners was one of the items in the presentation of Prof. MS Swaminathan on December 10, which was attended by more than 100 participants from different parts of the world. The feedback from MSSRF was positive mentioning that many of the participants appreciated the efforts of this mode of knowledge dissemination.

Direct to landless cattle owners: The study (over five months) reveals that 92% of the viewers of the information kiosk are landless cattle owners, which justifies the use of this powerful communication medium as a pro-poor one. The information exposure helps them in empowering – by realising that services could be obtained.

Impact Assessment:

1. Demand for more number of folders prepared on need driven information: **distributed to 1000 families**
2. Demand for more number of training programmes on cattle management / health :
   92 number of farmers trained.
3. Demand for more number of kiosks on cattle health in various institutions and request to incorporate more items.
4. 1,2,3 results improved the knowledge of cattle owners (*please see section on results*) resulting in
   - Decreased mortality of calves / animals
   - Early detection of sick cattle.
   - Early presentation of sick animals in the Veterinary dispensary for treatment
   - Demand for medicines (like deworming medicines)
   - Demand for potassium permanganate from dispensary (that can be used for washing the udder before milking)
   - Timely treatment for Repeat breeding

Actual impact:

1. Comparison of knowledge scores of landless farmers before and after exposure to various knowledge dissemination methods has revealed increased knowledge levels.

Knowledge Dissemination methods	Peri-urban region	No. of Respondents	Baseline score (Max. 10)	Present score (Max. 10)	Diff.
Training	Thengaithittu Manaveli Ariyankuppam	48	1.88	5.30	3.42
Kiosk	Villianur	31	3.64	5.74	2.10
Folder	Muthupillaipalayam	30	3.36	4.73	1.37
Training + Folder	Ariyankuppam	20	3.31	5.83	2.52
Kiosk + Folder	Thengaithittu	23	3.43	4.58	1.15
Kiosk + Training + Folder	Thengaithittu	21	3.27	5.61	2.34
Total		**173**	**2.99**	**5.28**	**2.29**

2. No. of farmers who have seen the kiosk:
   In the presence of kiosk facilitator (five months): 933
   In the absence of facilitator
   (guided by veterinarian / VFA) (four months) : 400

   Total no. of cattle owners viewed the kiosk : 1333

3. Translation of this knowledge into adoption is yet to be studied in detail.

Annex / Appendix

Publications:

1. Ramkumar, S., Ganesan. R., Heffernan, C. and Garforth, C. (2003). *Diseases affecting cattle in the peri-urban regions of Pondicherry, India: report based on stakeholder's meetings.* Rajiv Gandhi College of Veterinary and Animal Sciences, Pondicherry, India. The University of Reading, UK. Supported by the DFID Animal Health Programme, UK **(A)**
2. Ramkumar, S., Heffernan, C., Rao, S.V.N. and Garforth, C. (2003). *Designing the information kiosk on cattle health.* Rajiv Gandhi College of Veterinary and Animal Sciences, Pondicherry, India. The University of Reading, UK. Supported by the DFID Animal Health Programme, UK **(A)**
3. Ramkumar, S., Rao, S.V.N. and Garforth, C. (2003). *Evaluation of the training programme and the training manual: a report.* Rajiv Gandhi College of Veterinary and Animal Sciences, Pondicherry, India. The University of Reading, UK. Supported by the DFID Animal Health Programme, UK **(A)**
4. Ramkumar, S., Garforth, C. and Rao, S.V.N. (2003). *Information kiosk for dissemination of cattle health knowledge: evaluation report based on preliminary findings of research.* Rajiv Gandhi College of Veterinary and Animal Sciences, Pondicherry, India. The University of Reading, UK. Supported by the DFID Animal Health Programme, UK **(A)**
5. Rao, S.V.N. and Ramkumar, S. (eds) (2003). *Cattle health issues in the peri-urban regions: potentials of information in coping with poverty:* proceedings of the workshop held at Rajiv Gandhi College of Veterinary and Animal Sciences, Pondicherry, India on 20th and 21st March 2003. **(A)**
6. Ramkumar, S., Reddy, D.V. and Elanchezhian, N. (2003). *Improvising the farmer formulated ration: problems and prospects*. In Rao, S. V. N, Reddy, V and Natchimuthu, K.(eds) Dairy farmers-scientisits interaction on animal nutrition issues: *Proceedings of the Workshop* held on October 8 and 9, 2003, at RAGACOVAS **(A)**
7. Kandasamy, N., Sastry, N.S.R. and Chandrahasan, C. (2004). *Repeat breeding in crossbred cattle in peri–urban regions of Pondicherry, India – A rapid Appraisal.* Study undertaken for the Department of Veterinary Animal Husbandry Extension, Rajiv Gandhi College of Veterinary and Animal Sciences, Pondicherry, India. Supported by: DFID Animal Health Programme, UK **(A)**
8. Ramkumar, S., Garforth, C., Rao, S.V.N. and Heffernan, C. (2004). *Design and Formative Evaluation of an Information kiosk on Cattle health for landless cattle owners.* (to be submitted for publication to the European Journal of Extension Education). **(A)**
9. Ramkumar, S. (2004) Project Activities and Outputs. Presented in the workshop "Dissemination of Animal Health Knowledge" conducted on 11th and 12th March, 2004. **(B)**
10. Rao, S.V.N. Effectiveness of different knowledge dissemination methods used in the project. Presented in the workshop "Dissemination of Animal Health Knowledge" conducted on 11th and 12th march, 2004. **(B)**
11. Garforth, C. Strategies for effective dissemination of animal health knowledge. Presented in the workshop "Dissemination of Animal Health Knowledge" conducted on 11th and 12th march, 2004. **(B)**

12. Heffernan, C. ICTs and Knowledge Dissemination: Opportunities for the Livestock Sector. Presented in the workshop "Dissemination of Animal Health Knowledge" conducted on 11th and 12th March, 2004.
    (B)

13. Ten folders on
    - Repeat Breeding
    - FMD
    - Insurance
    - Activities of Animal Husbandry Department, Government of Pondicherry
    - Activities of RAGACOVAS

    (printed and being distributed)

    - Bloat
    - Mastitis
    - Deworming
    - Tick infestation
    - Breeding chart ***(in print)***

14. Cattle Health care manual ***(in print)***

15. Computer software designed on a participatory model on cattle health issues

16. Common first aid treatments given to the animals by the dairy cattle owners

17. Occurrence of common cattle diseases in the identified peri-urban regions of Pondciherry