The Development and Impact of the Livestock Guru: Meeting the Knowledge Needs of Poor Livestock Keepers in Tamil Nadu, India

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Abstract: Livestock keepers comprise 2/3rds of the 2.8 billion households living on less than two dollars per day. However, as a group they tend to be marginalised and excluded from formal service provision, particularly in relation to animal health. Therefore, the following paper describes the development of the Livestock Guru, a multi-media learning programme created to meet the knowledge needs of poor livestock keepers in Tamil Nadu, India. The findings from the study illustrate the importance of both appropriate visuals, voice-overs but also the need for addressing issues in the environment in which learning will take place.

Keywords: Livestock; Multimedia-learning; Animal Health; Poverty

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1. Introduction

A number of studies have shown that information regarding animal health in developing countries is extremely uneven (LDG, 2003; IFAD, 2004; Heffernan, 2005; Lin and Heffernan, 2009; 2010) and tools for information transfer are under-developed. While

large strides have been made in the human health with regard to information technologies (see Kushniruk, 2011; Gonzalez et al., 2011; Lee and Berge, 2011), the animal health sector has been largely left behind. Therefore the object of this study was to describe the creation of new means of delivering animal health information to marginalised populations, who depend on livestock for their livelihoods. A brief overview of the issues concerning delivery is presented, followed by a description of how the multi media program was created, tested and disseminated in Tamil Nadu, India.

Livestock keepers often face unequal access to information at both the community and national level. During the 1980's the focus was to support veterinary government departments and training of veterinary personnel (LID, 1998). However, the majority of funds went on staff salaries, with often little money left over to fund the actual delivery of animal health services (De Haan et al., 2001; Young and Odhiambo, 2003). Therefore, to reverse this state of affairs, the World Bank and other donors fostered an approach referred to as 'structural adjustment' (De Haan et al., 2001). Thus, to meet the conditions of aid, donor governments had to restructure their civil services. Consequently, the veterinary services in many countries around the world were significantly reduced leaving both an information and service delivery vacuum that is still being felt today (Young and Odhiambo, 2003).

Nevertheless, the lack of veterinary manpower is not the only factor in the information gaps of poor livestock keepers. Other issues include: physical constraints such as geographical barriers (Murphy, 2003). For example, poor livestock farmers who live in remote areas are normally neglected regarding access to information (Ashley et al., 1996; LID, 1999). Secondly, cultural practices or beliefs can either restrict or constrain the access to information by some sections of communities (LDG, 2003; Fuller, 2006). One such constraint is sexual discrimination, whereby women in some countries or communities do not share the same opportunities to access information resources as men in the same community (Gurumurthy et al., 2004; Fuller, 2006).

Another issue is literacy, as information is often accessible in written pamphlets, leaflets or posters (Liu, 2001). Such material may be difficult to interpret or access by individuals with low or absent levels of formal education. Globally, the illiterate population in rural areas is much greater than in urban areas (Kabir et al., 2003). Even within communities with good access to information and ostensibly high literacy rates there may be groups or sub-populations, which remain marginalized from information flows (LDG, 2003). For example, in India, caste is often a critical factor in who obtains information. As such, information gaps can have a geographic, educational and social component.

Moreover, in recent years there has been a large debate within the development literature about the appropriateness of the information on offer for the audience (Chambers, 1983; Narayan et al., 2001). This debate has also reached the livestock literature (Nielsen and Heffernan, 2006; Heffernan and Nielsen, 2007; Nielsen et al., 2010). Some further argued that veterinary knowledge should not only be from a textbook, but also from indigenous skills (Dung et al. 1997). However, while there is undoubtedly value in traditional medicine, recent studies have shown that livestock keepers often misdiagnose diseases and/or apply inappropriate treatment regimes (Heffernan and Nielsen, 2007; Heffernan et al., 2009).

There are a variety of ways that the information needs of poor livestock keepers, particularly those living in remote areas can be met. First, extension messages can be relayed by radio. Indeed, radio as a means of disseminating extension messages has a number of benefits: the format can be standardized with low infrastructure costs for

producers (Madamombe, 2005; Maru and Latchem, 2005). At the farm-level, machines and therefore, messages are highly portable and inexpensive for consumers (Maru and Latchem, 2005). Indeed, the power of radio has long been recognized in wider agricultural extension as it enables isolated farmers to share farming tips and income generation ideas (Madamombe, 2005). Nevertheless, radio, as a medium presents a number of constraints to learning. First and foremost, radio broadcasts are part of a one-way communication channel (Werbach, 2003). Users have no way of getting further information or asking questions when material is presented in this format. Equally problematic from the practitioner's point of view, getting feedback from farmers regarding what they have learned is often difficult. Finally, radio is not a demand-led media. In other words, programmes are generally made, which reflect listener's interests, but listeners generally cannot choose the material on offer, other than turning their radios off or changing the channel. Therefore, the choice for a listener is either: the livestock programme or something else, specific issues of relevance to the individual involved cannot be explored. Indeed, farmers often have an immediate need for animal healthcare assistance, to aid a sick animal (Peeling and Holden, 2004).

Thus, there is a need for tools that support high quality, demand-led learning (see Wong et al. 2007; Dealtry and Howard, 2008; Alkhattabi et al., 2010) in which farmers can choose the information of most relevance at the time period most convenient. Therefore, the authors turned to Information and Communication Technologies (ICTs). The Livestock Guru is a multi-media learning tool created to support new knowledge acquisition among poor livestock keepers in Tamil Nadu State in India.[1] The design of the Livestock Guru was based on the Information Processing (IP) theory of learning (Nielsen and Heffernan, 2006; Heffernan and Nielsen, 2007). Following this approach, the Livestock Guru mimicked the learning environment of relevance to the users' daily life. As will be fully described below, in order to support demand-led paradigms, the software was designed to be fully inter-active i.e. users have the choice over the learning material on offer.

2. Methods

The Tamil Livestock Guru is a touch screen technology, which provides guidance on animal health and husbandry issues to Tamil-speaking, poor livestock keepers. Gleeson et al., (2004) noted that the touch screen option, rather than a keyboard was often easier to use. As the clients of the program were poor livestock keepers, there was an assumption at the design stage was that they have low or no experience with computer keyboards. Second, the touch screen enabled access by illiterate users.

The software was created in Adobe Director. A range of versions (V7.0 – V11.0) were involved in the development over time. Director V7.0 combined graphics, sound, animation, text and video to create streaming, multi-user, interactive multi-media material (Macromedia, 1998). From Director V8.0 to V11.0, many new features were introduced such as 'New Cast View', 'Linked Scripts', and 'Multiple Publishing Formats' (Macromedia, 2008). Two updates, however, improved the development of the Tamil Guru. First, was the extended support to a wide range of audio formats i.e. MP3 audio, which could be added into Director. In this manner, the size of the Tamil Guru

1 The Livestock Guru program has been launched in India, Bolivia and Kenya in five language versions: Tamil and Oriya (India), Aymara and Quechua (Bolivia) and Kiswahili (Kenya). The following paper details the creation of the Tamil version of the software.

program could be dramatically reduced, while enhancing the speed and making the software to be less reliant on the capability of the hardware. Another feature introduced to the Tamil Guru was Adobe Flash. Adobe Flash is a well-known program for creating 2D animation. Flash can produce smoother animations and, more importantly, development is much faster than when utilizing other editing tools in Director. Therefore, the most recent version of the Tamil Guru contained more animations, yet the total size of the program was reduced.

2.1. Functionality

The functionalities of the Tamil Guru related to two areas: first, the software enabled the poor to access livestock-related information and second, the program captured the choices of the poor for information and transferred this information to decision-makers. In this manner, understanding the demands of the poor for information on a wider level can enhance the targeting of aid in general and livestock projects more specifically. As such, the information collected by the software included user information (both personal, family and livelihood relevant information), user preferences and problem tracking (errors and system protection). The following figure illustrates the functionality structure of the Tamil Guru (Figure 1).

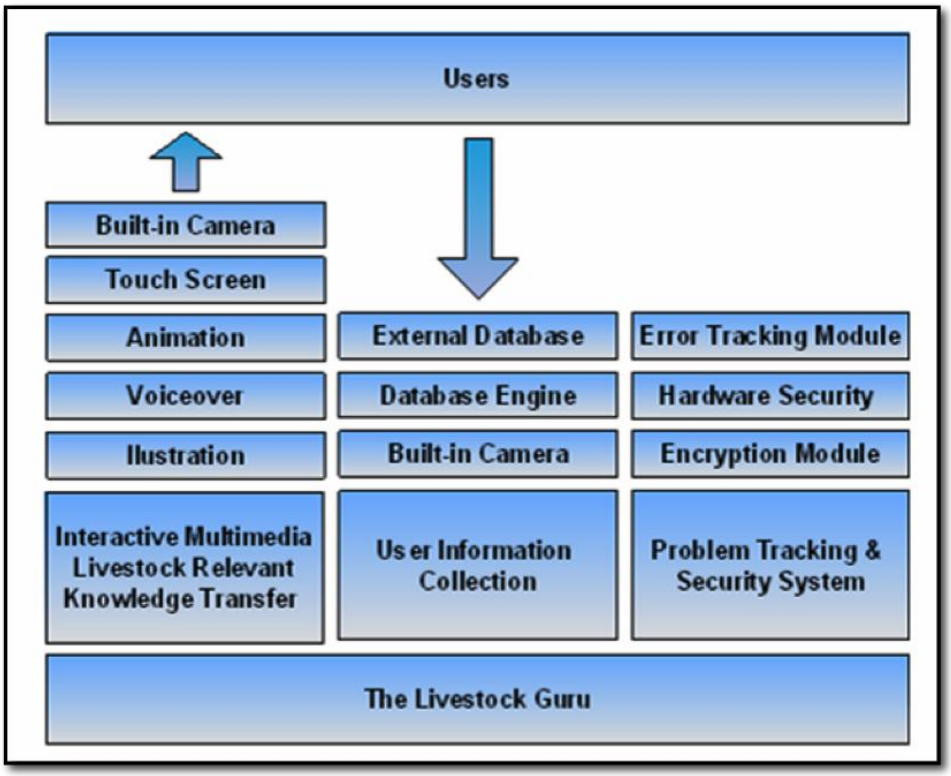

Figure 1. The Tamil Guru functionality design

To underpin the programme and capture the demands of the poor, a database was created to monitor and capture user input. A web-camera was also included to take a picture of the user as part of the registration feature and as a means of further engaging

and immersing users in the experience. The database and web camera were supported by program plug-ins. By recording the demands of the poor for information, the database can inform veterinarians and relevant stakeholders.

2.2. Building the Program

In order for the Tamil Guru to be culturally relevant to users, the design took into primary consideration local customs and traditional culture. Studies have found that users with low levels of formal education learn better when content is 'situated' within their cultural context (Neilsen and Heffernan, 2006; Heffernan and Nielsen, 2007; Nielsen et al., 2010). Further, as the overall objective of the Tamil Guru was to transfer knowledge regarding livestock keeping, it was critical that the 'knowledge' design, organized the content systematically, to ensure ease of use.

The programme was designed to let the user choose the learning material desired. As detailed above, the program has a voiceover that provides instruction and information to the user. The content, in addition to being evidenced-based (i.e. based on the priorities of the poor livestock keepers) also included information that would be beneficial to successful livestock-based livelihoods. After listening to the introduction and registering, users could access the content.

The content was first divided by livestock species (Figure 2). After choosing the species of interest, the user could then choose one of three broad modules: Feeding, Housing or Disease. After making a selection, the user would be asked to choose their particular areas of interest e.g. the cattle disease component of the Tamil Guru contained 21 diseases, while the sheep disease component contained 4 diseases etc. Within each disease module, all of the learning information proceeded in the same sequence: Causation, Symptom, Treatment and Prevention. When completing a module the user then has a short multiple-choice quiz on the topic.

Figure 2. Tamil Guru animal navigation: selecting the species of interest

Figure 3. Tamil Guru cow navigation

The information collection module was designed to collect data from the Tamil Guru. Indeed, the feedback of users was crucial both in relation to updating the program and with regard to measuring user-demand.

2.3. User Feedback: Design

All elements of the visuals of the software program were tested to ensure appropriateness and visual accuracy. Three communities (two in Pondicherry and one in Tamil Nadu States), were selected for inclusion in the study. In each community, the project was discussed with local leaders and subsequently village-level meetings with interested individuals, were held. Purposive sampling was utilised to identify poor livestock keeping households. Criteria for selection as the interviewee, was being responsible for the direct management of the family's animals. In total, 97 individuals participated in the Tamil Guru testing.

The first part of the analysis tested the following Guru image (Figure 4).

In semiotics there are two types of signifiers: denotative and connotative (LDG, 2003). The denotative signifier is the defined agreed meaning of a term. An example is a cow. Within the Tamil Guru all the visuals of the animals were from local breeds, found in that region. However, what the animals signified to the livestock keepers is captured by the context and therefore, had connotative meanings that are wider than the actual images. Indeed, the connotative signifiers have socio-cultural or even personal notions. The concept of Guru itself had both denotative and connotative elements. The denotative meaning was as an Indian man who encapsulated great wisdom and offered the path to

knowledge. The connotative signifiers of the Guru included the visual representation. All character pictures were tested on the following four elements for appropriateness/desirability: clothes, hair, accessories (i.e. appropriate/non-appropriate) and desirable facial features (i.e. smiling, friendly, aloof).

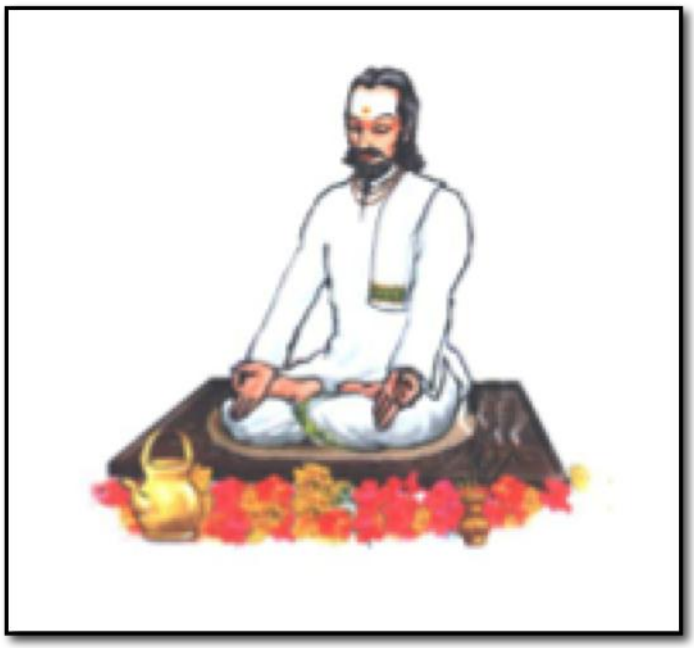

Figure 4. Guru character I

Therefore, focus groups and key informants were asked to discuss the different features and choose the elements, which most approximated a 'local person who would be a recognized expert in livestock'. Equally, elements of trust were also explored i.e. 'would you trust this individual to treat your livestock? Why or why not?' Interestingly, the figure above (Figure 4) Guru character I elicited strong negative reactions from study participants. The character was based on the transcendental interpretation of a Guru. It was assumed from a connotative perspective that the Guru was virtually opening a gate behind which was knowledge. Surprisingly, the majority of negative comments related to the facial expression and the accessories surrounded the seated figure. Key perceptions included the notion that the figure was untrustworthy and possibly a charlatan. The finding outlines the importance of understanding the socio-cultural connotations of visual illustrations. Connotative notions of Guru 1 were, from the perspective of the research team, of a religious leader with followers. Obviously, local livestock keepers did not share this view. Therefore, based on the focus group discussions, Guru Character II and III were derived (Figure 5).

Guru Character II was created from the starting point of a trust-worthy yet admirable character derived from a Ghandi type model. Again the character perhaps suffered from external connotations. The participants viewed Guru II as representing a knowledgeable farmer but the perceptions did not refer to simple authority. Although Guru II had more positive connotations Guru character III tested positively as a learned character able to proffer advice on a wide number of topics. As such, Guru character III was chosen for the programme. However, many of the participants believed that although the Guru would be convincingly knowledgeable regarding caring and housing animals

and disease diagnosis, he would lack authority regarding disease treatment. Therefore, the character of a vet was created as shown above in Figure III. The question was if there was a denotative notion of a vet. To explore this, a stethoscope and an animal were utilised as props in the initial illustrations. For the respondents in the focus group, the illustration represented an educated professional, man of a higher caste. Further, the group felt that the visual characterisation of the vet also needed spectacles, a watch and more urban dress. There was also a notion that a vet will have different/lighter skin tones. With these changes, participants unanimously agreed on the representation of the vet. Nevertheless, when asked if the vet should replace the Guru as the single character in the program, most participants felt this would make the information less accessible. Indeed, in India, veterinarians due to notions regarding social exclusion are often not utilised by the poor (Heffernan et al., 2009). Equally, problematic, respondents noted that vets had a very prescribed role in animal health as opposed to livestock production and husbandry. Therefore, it was not plausible that a vet would be offering information on feeding and housing. In addition, participants stated that women carried out husbandry and management of animals. In order to respond to this, a women character was introduced in these sections of the program.

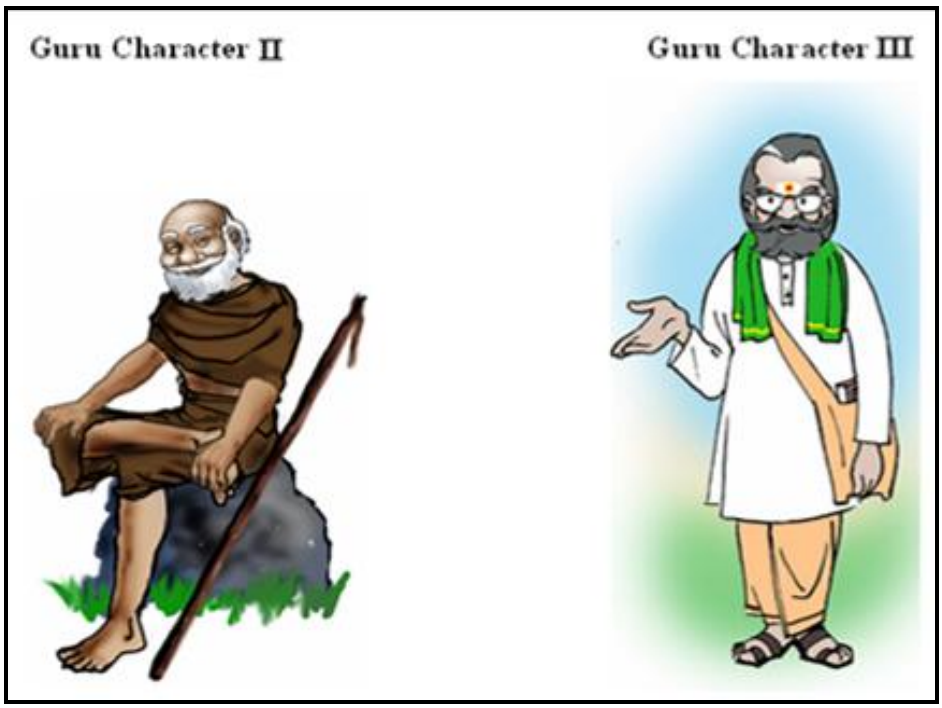

Figure 5. Guru character II and III

Next, the Guru's voice was tested on stakeholder groups. Over 40% of respondents found the initial voice utilized in the Livestock Guru to be unsatisfactory. Reasons relating to the accent and volume were the foremost concerns and comprised over 50% of the negative responses. To address this issue, stakeholder groups were asked to choose out of a panel of voices, the one they most preferred. Interestingly, there were gender differences in the voice testing i.e. women tended to prefer louder and deeper voices, whereas men ranked quicker and shorter cadences higher. To account for these differences, the voice, which received the most positive responses, was chosen.

Figure 6. 'Shakti': the female character of the Livestock Guru

In addition to visual and audio testing a further study to consider the impact of the software on learning was conducted (Heffernan and Nielsen, 2007). The study explored the uptake of knowledge of the program in comparison to videos and pamphlets. The results demonstrated the superiority of the software program over more traditional forms of extension delivery.

After the testing phase, the Tamil Livestock Guru was delivered to Village Knowledge Centres set-up by the MS Swaminathan Foundation (MSSF) (see www.mssf.org). Once in-situ, other issue arose with regard to client use. For example, the volume of the program was often problematic. Some locations in which kiosks were placed were very noisy so it was difficult for clients to hear the learning material. When the volume was too loud, then staff members manning the Village Knowledge Centres found it difficult to concentrate. In order to address the issue of noise and volume improvement the first solution was to increase the volume and attach a headset. However, many clients, particularly women found the headsets alien and found them cumbersome. Therefore, to address the issue, a phone was attached to the kiosk (Figure 7).

As all of the clients including women, were accustomed to using phones, the addition of the phones proved to be very popular. Thus, while the familiarity of the kiosk itself and using a touch screen was not a problem from the outset, listening to the program through a headset was. Therefore, interestingly, solutions relating to volume issues were best responded to via a familiar technology: the phone.

Figure 7. Kiosk with phone

3. Results

3.1. User Figures

The data presented below was collected from three kiosks placed in Tamil Nadu and Pondicherry from 2004-2008. The total figures exclude those exposed to the program via the testing (the 97 individuals detailed above). In total, three kiosks were placed in the Village Knowledge Centres. Machines were provided to the communities in a small ceremony, all village residents were welcome, local religious leaders blessed the kiosks. The aims and objectives of the Guru were detailed to residents, and the research team illustrated how the program worked. After the initial introduction, all further dissemination activities relied on word of mouth.

Table 1. Tamil Guru: user figures

Year	User numbers
2004	470
2005	549
2006	1121
2007	4484
2008 （Up to March, 2008）	2094
Grand Total	8518

As indicated above (Table 1), usage of the Tamil Guru considerably increased over time. In addition to recording user family size, livelihood information, gender and years of education, the data also revealed what information the clients sought.

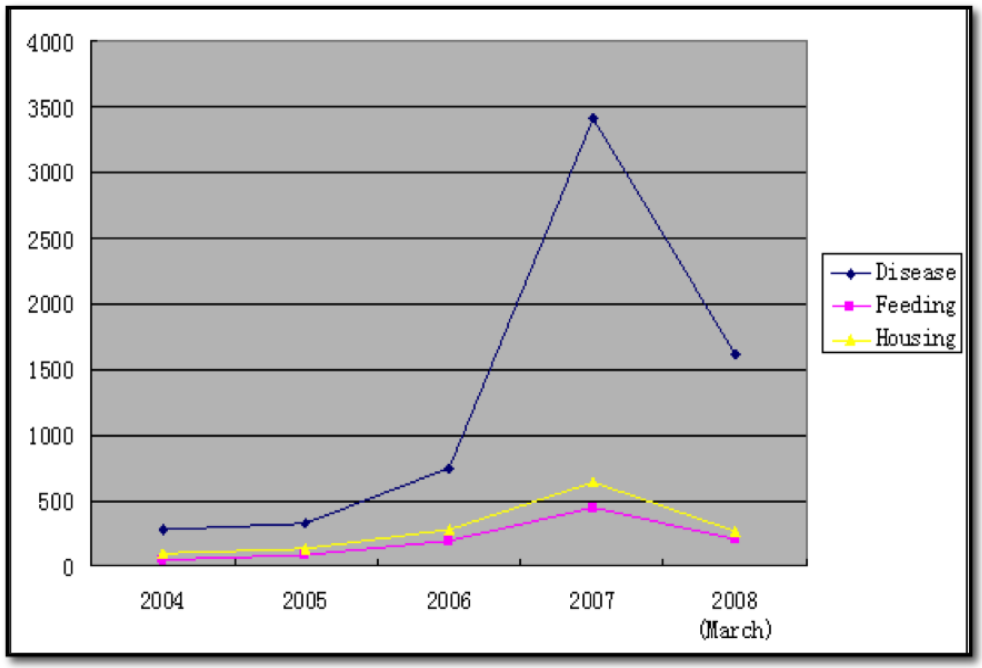

Figure 8. Livestock Guru user figures by year

In 2005, the machines were first placed in three Village Knowledge Centres, which had not been exposed to the program previously. During this initial period, information regarding livestock feeding and housing were largely similar in terms of access, whereas the access rates for disease information were slightly higher. However, the rapid adoption of the Tamil Guru over time follows the classic curve predicted by the Diffusion of Innovation Theory (see Rogers, 2003; Heffernan et al., 2010).

Further, in relation to the particular information that farmers were seeking, while animal management and production information remained fairly constant, the information relating to diseases tended to spike in relation to disease outbreaks (Figure 9). However, rather than simply exploring the specific disease in question, farmers were seeking wider knowledge sets regarding the animal health constraints of the particular species in question.

As the figure illustrates, across the three communities, it was Annavasai (followed by Thiravaiyaru and Koonichempet), which had the largest spike in disease usage. Users were viewing the Newcastle disease and Foot and Mouth Disease modules with the highest frequency. Outbreaks of the two disease were later confirmed by local government veterinarians, working in the district at the time. The increase of livestock keepers seeking out the particular disease modules during outbreaks indicates the Tamil Livestock Guru was viewed as a potential source of information rather than merely having novelty value.

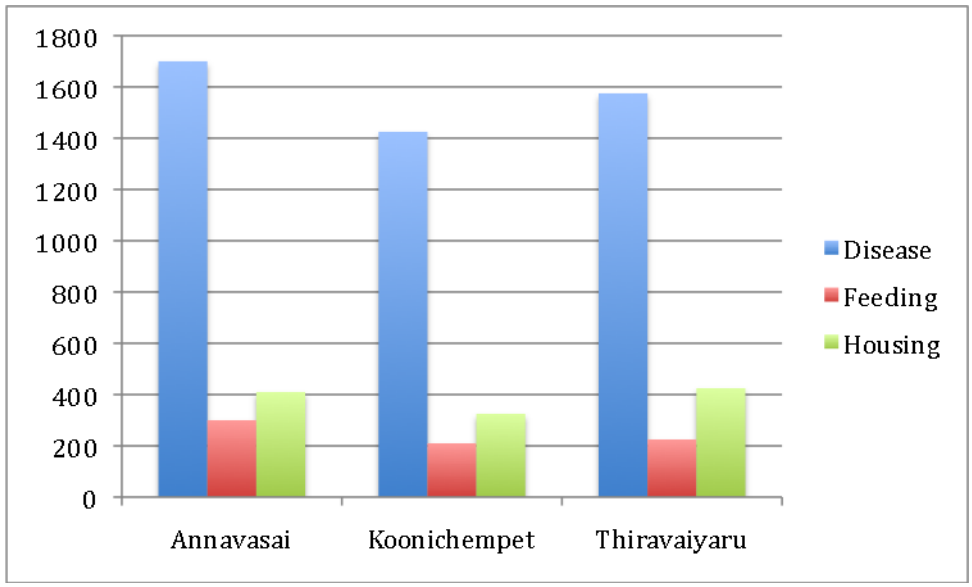

Figure 9. User figures by community (2005-2008)

Overall, cattle proved to be the species of most interest to users of the Tamil Guru (Figure 10).

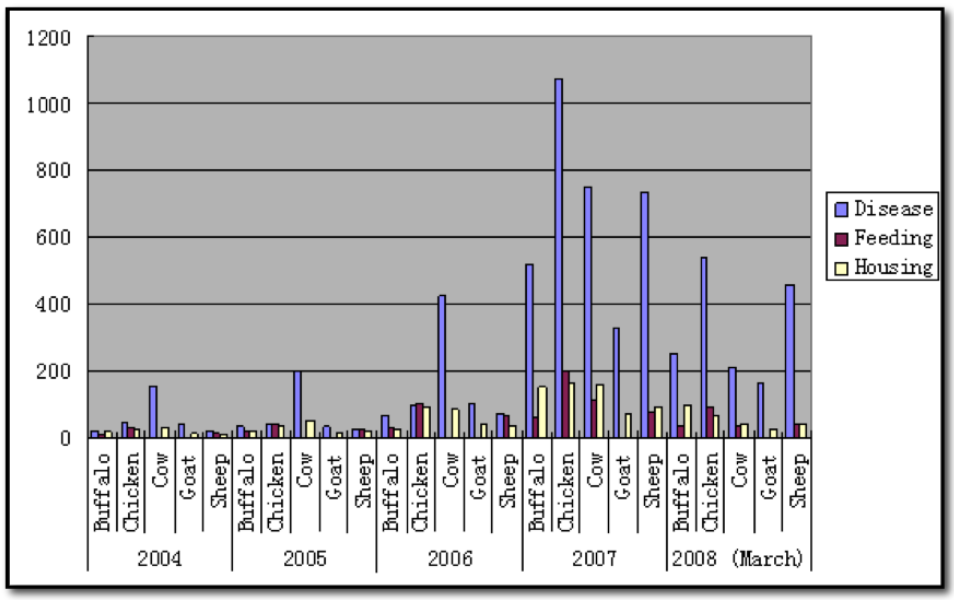

Figure 10. User figures by species and year

As the figure illustrates, cattle diseases proved the most popular over the five-year period (2004-2008). Indeed, cows have both a high financial and social value amongst Tamil livestock keepers. In 2007, the rise in poultry diseases can be attributed to the Newcastle disease outbreak noted above.

Interestingly, women users largely matched men (Figure 11).

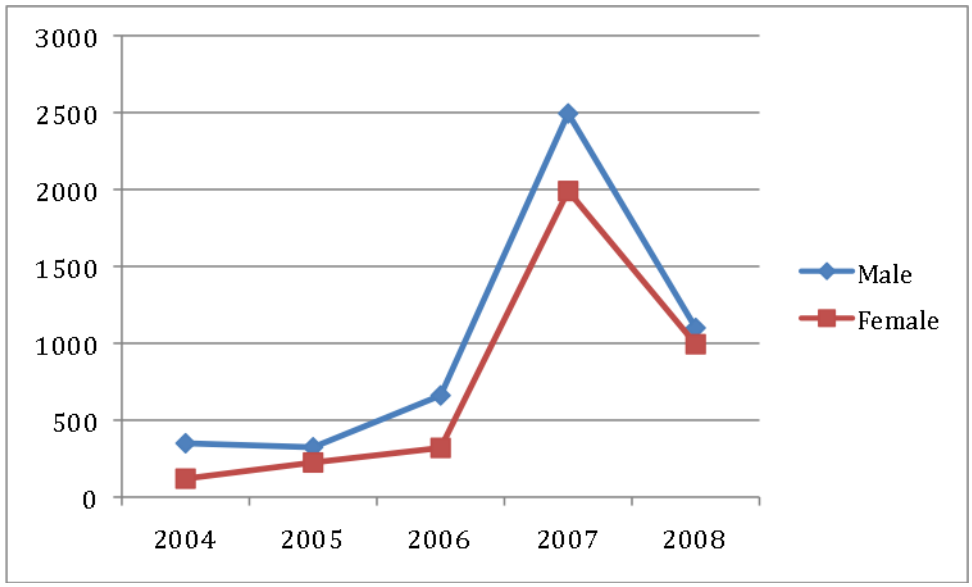

Figure 11. Access by gender

At present, there is a wide body of literature that has illustrated that development information aimed at poor livestock keepers often does not reach the intended recipients and if it does, it is in an inappropriate format to support learning. Part of the problem is clearly the blanket manner in which information is distributed. Poor livestock keepers are a vast and diverse group with very different knowledge needs. Therefore, new tools are required, which address these diverse needs. The creation and testing of the Tamil Livestock Guru illustrates the desire that poor livestock keepers have for relevant and accurate information. However, the study also indicates the critical importance of relevant and accurate visuals when creating multi-media programmes. The results displayed the strong preferences of the poor for both the visual and aural depiction of characters. Indeed, the results of the visual testing demonstrated that programme visuals need a firm basis in the local context and illustrations that do not match local outlooks are less favourable. As the testing of Guru characters I-III portray. The first character was perceived as being a 'Baba' or holy man with little links to livestock, while Characters II and III were more firmly based in local notions of a 'poor livestock keeper'. Particularly if a character is viewed untrustworthy the program is unlikely to be convincing to the client. Equally, the role of the characters (rather than simply what they look like) has an equally important role in user engagement. The impact of the Tamil Guru was the increased knowledge of the poor livestock keepers involved and was accessible to both men and women, who would otherwise have no access to information. Increased use during outbreaks implies the users were looking for the software to supply answers to specific queries. The increasing use of the program over time indicated that their queries were being answered.

4. Conclusions

The success of livestock-based livelihoods will clearly be dependent upon poor farmers receiving appropriate and relevant information regarding the livestock in their care. Studies have shown that there are rapid gains in productivity and animal health when farmers are part of appropriate and timely knowledge transfer activities (Owen et al, 2006). The results of the Tamil Livestock Guru clearly illustrate the desire of poor farmers for information and the benefits of a 'stand alone' product, which delivers this information on-demand.

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