DESIGNING A CD–ROM FOR AWARENESS ABOUT ABORTION IN DAIRY ANIMALS

Thesis

Submitted to the Guru Angad Dev Veterinary and Animal Sciences University in partial fulfillment of the requirements for the degree of

MASTER OF VETERINARY SCIENCE
in
VETERINARY AND ANIMAL HUSBANDRY EXTENSION EDUCATION
(Minor Subject: Veterinary Gynaecology and Obstetrics)

By

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CERTIFICATE I

This is to certify that the thesis/ dissertation entitled, **"DESIGNING A CD–ROM FOR AWARENESS ABOUT ABORTION IN DAIRY ANIMALS"** submitted for the degree of **M.V.Sc.** in the subject of **Veterinary and Animal Husbandry Extension Education** (Minor subject: **Veterinary Gynaecology and Obstetrics**) of the Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, is a bonafide research work carried out by **Manoj Kumar Sharma (L-2013-V-16-M)** under my supervision and that no part of this thesis/dissertation has been submitted for any other degree.

The assistance and help received during the course of investigation have been fully acknowledged.

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CERTIFICATE – II

This is to certify that the thesis entitled **"DESIGNING A CD–ROM FOR AWARENESS ABOUT ABORTION IN DAIRY ANIMALS"** submitted by **Manoj Kumar Sharma (L-2013-V-16-M)** to the Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, in partial fulfilment of the requirements for the degree of **M.V.Sc.** in the subject of **Veterinary and Animal Husbandry Extension Education** (Minor subject: **Veterinary Gynaecology and Obstetrics**) has been approved by the Student's Advisory Committee along with the Head of the Department after an oral examination on the same, in collaboration with an external examiner.

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ABSTRACT

Increased awareness of the dairy farmers about correct managemental practices is the most limiting factor determining the productivity and profitability of an enterprise. Effective communication between extension workers and dairy farmers is required to tackle the constraints at its initial level. The communication devices which can overcome the literacy barrier and engage multiple senses of the user, are best suited for maximum results. Audio visual aids are the best choice to achieve this target attributing to their multiple advantages. Present study entitled **"Designing a CD–ROM for awareness about abortion in dairy animals"** was conducted to develop a video based instructional device for farmers. This was evaluated for knowledge gain by the dairy farmers before and after exposure to it. The multimedia elements of the developed CD-ROM were found appropriate in conveying the required message by the subject matter experts. There was **81.18 %** knowledge gain about general terminology and causes while a gain of **63.44 %** was recorded in knowledge of respondents about management, control and prevention measures of abortion in dairy animals. Overall, there was **71.77 %** knowledge gain among the respondents about all aspects of abortion in dairy animals. The CD-ROM was assigned a final rating score of to be **3.87** out of **4** by the experts, finding it as an effective mean to deliver the message to the viewers. Therefore, the developed CD-ROM credibly performed its function of increasing the awareness of the farmers about abortion in dairy animals and will enhance their production efficiency and profitability positively.

Key words: Abortion, Awareness, CD-ROM, Dairy, Effectiveness, Multimedia.

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Signature of Major Advisor **Signature of the student**

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LIST OF ABBREVIATIONS

%	:	Percentage
Ad lib	:	Ad Libitum (As Desired)
CD-ROM	:	Compact Disk Read Only Memory
DVD	:	Digital Versatile Disc
et al	:	And others
Fig.	:	Figure
GADVASU	:	Guru Angad Dev Veterinary and Animal Sciences University
GDP	:	Gross Domestic Product
GOI	:	Government of India
i.e.	:	That is
NDDB	:	National Dairy Development Board
NDRI	:	National Dairy Research Institute
S.E.	:	Standard Error
SPSS	:	Statistical Package for Social Sciences

CHAPTER I

INTRODUCTION

India is a developing country with majority of its rural population dependent on agriculture and its allied sectors for their sustenance. Agriculture contributed 15.18% to the total GDP of country in 2011-12. While animal husbandry provided 26% of this contribution (3.98% of total GDP) and it is on the rise with each year (Central Statistical Organization; GOI). Due to the production plateau already achieved and no further scope of improvement in production in agriculture sector, diversification is the need of hour. Diversification will ensure the income security of the farmers and on the other hand will also reduce the burden on agriculture sector alone. Commercial dairy farming is one of the viable options and has been successfully adopted by the farmers. Dairying is an instrument of great importance for improving socio-economic status of rural population particularly in landless and marginal farmers (Kaur, 2004). This has also made Punjab one of the leading states in milk production (5^{th} rank) but still there is a lot of scope for improvement.

India is the largest milk producer in the world with a production of 132.4 million tonnes in 2012-13 (NDDB, 2014). But the milk production per animal is too less compared to the developed and dairy primed countries. The success of a dairy farm is dependent on the four pillars of breeding, feeding, heeding and weeding. All these have to be precisely adopted to have maximum benefit/profit. Fertility of the animals directly affects the reproduction and thus in turn production level of the dairy farm. The increase in production is directly related to good reproductive efficiency of the animals. Economic viability of a dairy venture depends upon reproductive efficiency of its herd. Successful reproductive efficiency comprises the ability to mate, capacity to conceive, nourish the embryo and deliver the viable offspring on completion of the gestation period without any complication (Chand 2011). Concisely, lesser the reproductive losses (in various forms) in a dairy farm, more is the profitability of the venture.

Anoestrus, repeat breeding, genital prolapse, retention of placenta and abortion are the common reproductive disorders affecting the milk production in the dairy animals, thus cause huge economic losses to the farmers. Abortion in pregnant animal

leads to multidimensional negative effect on the economy of livestock owners in the form of:

1. Loss of future progeny
2. Reduced milk production
3. Increased number of days open leading to enhanced intercalving period
4. Treatment cost
5. Infection carrier and threat to other healthy animals

A low rate of abortions is usually observed on farms and a 3 to 5 percent abortion per year is often considered "normal." However, the loss of any pregnancy represents a significant loss of (potential) income to the producer and appropriate action should therefore be taken to prevent abortion and to investigate the cause of abortion that has occurred. Each abortion is estimated to cost to the dairy farmers Rs. 30,000-50,000 depending on milk and feed prices, replacement stock and the stage of gestation when the abortion occurs (Verma *et al* 2015).

Effective communication is the basis of development administration of any institution or organisation as the better communication can flag the issues and provide the solutions to the end users. To make the farming communities better informed in the use of innovation and technologies, the extension worker requires suitable communication devices that can overcome the barriers of illiteracy and traditions which are prominent among the resource poor farmers and drive home the message effectively (Hai *et al* 2003). Audio visual aids are one of most suitable and available mediums which can be easily exploited for efficient delivery of knowledge and relevant information to field level users. Among various audio visual media available, the emerging interactive video CD and DVD hold great promise in imparting technical skills to farmers. Video communication has reached almost all villages and towns in Punjab and also in whole of the country. Multimedia CD-ROM has become popular electronic media that makes learning more interesting, multi sensory and also enables the learner to correlate the things with his own scenario. Further, such resources once developed can easily be multiplied and distributed for learning across wider sections of population. The multimedia ‘CD-ROM’ regarding abortion in dairy animal is not available for dairy farmers. Most rural households and others, engaged in livestock rearing in Punjab own television sets and CD, DVD players. Hence an

educational video – DVD on abortion in dairy animals can be considered as a medium to disseminate knowledge to the livestock owners.

Though the preparation is a very difficult task but taking into account the advantages of the present day electronic devices, it inspires us to do so. As an instructional device, the compact disc- read only memory (CD-ROM) is popular for dissemination of exact information. Further CD-ROM allows different forms of data types such as text, audio, video and images to be played in a synchronized fashion. It helps to exploit the role of multi sensory perception in learning process. CD-ROM has various other advantages, which can be briefed as:

1. **Capacity:** A standard CD-ROM can keep and store approximately 700 megabytes information. The huge disc capacity makes it feasible to integrate text with multimedia segments to make the message more catchy and comprehensive for the learner.
2. **Portability:** Being compact and light weight, the CD-ROM can be transported anywhere and is very cost effective for information communication.
3. **Usability:** It is very much user friendly device and no skill is required to run it for getting the information. The users can access the information on CD-ROM singly and learn the things at his own place by playing it again and again. It provides unlimited opportunity to review scientific information, sounds, pictures and useful graphs and tables.
4. **Durability:** CD-ROM media has a long shelf life. It can store data effectively for a very long time and chances of damage are quite less.

Keeping in view the facts stated above present study was planned to achieve following objectives:

1) To develop relevant text and graphic illustrations regarding abortion in dairy animals.

2) To design multimedia application (CD-ROM) on abortion in dairy animals.

3) To test its effectiveness and validation.

Significance of study:

Presently the dairy industry in India is booming one, so also in Punjab. Commercial dairy farming has been on rise in Punjab. There is a great role of GADVASU, Animal Husbandry Department & Dairy Development Board in providing information and technical support to the farmers so that they can venture

into dairy farming and earn maximum benefits from it. Dairy farmers need constant guidance and consultancy to avoid various preventable losses in dairy farming. Reproductive efficiency of the animals needs to be maintained by adopting various preventive and control measures. “A calf a year” is an ideal target for a commercial dairy farm. A pregnant animal is the biggest asset of a dairy farm. It is the promise of return on investments made in the venture. Abortion is one of the devastating happenings which can hamper the economy of dairy farmer by sweeping away all the prospective income. To avoid this, dairy farmers need to be acquainted with various causes, pathogenesis, control and prevention measures of abortion in dairy animals and need to follow the correct management practices. This study has been carried out to make available comprehensive and holistic information and knowledge to farmers. The prepared CD-ROM will act as a beacon of guidance to farmers so that they can reduce the losses occurring due to abortion to minimal levels. Surely this will increase their profit from dairy farming and will uplift their socio-economic status. The study will also enhance the inclination of farmers towards the use of information and communication technologies in the field of dairy farming or livestock rearing.

Limitations of Study:

Although every effort has been made to make this study as efficient as possible, but it is subject to certain unavoidable limitations:

1. The study being a student’s research project, suffers from the limitations of time, money and resources.
2. The abortion most of the times being a sudden, unexpected happening in a dairy farm, cannot be recorded fully from beginning to till the end.
3. The opinion of the evaluators is limited to the extent of objectivity.
4. The determination of effectiveness is limited to degree of appropriateness of CD-ROM as an instructional tool to a smaller number of farmers at a point of time but the real evaluation will come after its use by a large number of dairy farmers over a long period of time.
5. The effectiveness of the developed CD-ROM can only be justified by comparing it with other information communication tools and methods singly or a combination there of, on different groups of respondents.

However, every possible care has been taken and efforts have been made to get the objective responses and generalise the results for better dissemination of the message to the viewers.

CHAPTER II

REVIEW OF LITERATURE

A review of literature is designed to identify related research in the past, to set the current research project within a conceptual and theoretical context. It helps us to begin from where the earlier researchers have reached and to refine and obtain better research results by learning from the limitations of their studies. The literature available through internet, journals, magazines, books and periodicals was browsed and has been presented under the following heads:

2.1 USE OF AUDIO-VISUAL INSTRUCTIONAL MATERIALS FOR KNOWLEDGE DISSEMINATION

2.2 PROFITABILITY OF DAIRY FARMING VIS A VIS AWARENESS LEVEL OF FARMERS

2.3 INCIDENCE AND AWARENESS OF FARMERS ABOUT COMMON REPRODUCTIVE PROBLEMS

2.1 USE OF AUDIO-VISUAL INSTRUCTIONAL MATERIALS FOR KNOWLEDGE DISSEMINATION

Dascanio *et al* (1997) developed a multimedia case–simulation computer programme for teaching animal nutrition. The programme provided menu selection, icon choices and responses determined on the basis of contents of text files, which varied from case to case. The modules were on common nutritional principles as well as specific modules (i.e. Canine, Feline etc.) and were developed on two levels. The level one for the use by first, second and third year veterinary student while level two for the use by advanced veterinary students. Once user had solved the problems, they could go to the question area to answer specific questions concerning the case. Users were constantly provided with a total point score depicting their performance.

Block and co-workers (2000) developed an interactive CD-ROM for nutrition screening and counselling to produce dietary behaviour change in fat, fruit and vegetable intake. The design was based on the principles of relevance to the learner, readiness for change, feedback, individualization, facilitation of skills and goal setting. It was tested in community setting such as libraries, senior centres, and women, infants and children clinics. Nearly 80% of the respondents (n=284)

including numerous low income persons reported learning something new about nutrition and health on their own dietary habits. More than 50% of those recontacted 2 to4 weeks later had put some of their dietary goals into practice. This program was useful for dietary screening, feedback, skill building and motivation in settings in which in-person counselling by nutrition professionals was not feasible.

Kirubaharan *et al* (2000) developed a computer aided instruction package named 'VIRUS' which was intended for Veterinary undergraduate students. The package contained main menu which consists of option like definition, morphology and classification. The user was provided required programme by typing virus of prompt and look through the menu to use the option as per one's own need for instruction. This programme became very popular among students for judging their performance.

Sharma and Kumar (2000) reported that in the existing scenario of farmers training in the country, video based farmers training can play a significant role in enhancing quality of learning in a cost effective manner. Similarly, Pandian *et al* (2002) conducted a study on the effectiveness of video education and reported that majority of the respondents indicated that video education on the selected enterprise was as effective as an educational tool in terms of knowledge and retention of information.

Sloan *et al* (2002) conducted a study to assess the educational value and acceptability of a short CD-ROM course on cancer pain management given to third year medical students at University of Kentucky. Thirty six medical students were given a short course CD-ROM including textual instruction as well as video clips and 15 items interactive self assessment examination on cancer pain management. Students were asked to evaluate the computerized course with an 18 item survey using a Likert scale (1= disagree, 5= agree). Twenty seven medical students completed the course, however only 11 returned evaluations. In general the medical students appreciated the CD-ROM material with the exception of video clips. Students agreed strongly that educational material on the CD-ROM was presented clearly, the CD-ROM format was easy to use, and the CD-ROM course improved knowledge of opioid use for cancer pain and improved understanding of opioid related side effects.

Garforth (2003) concluded that computer based information and communication technologies (ICTs) are a big step in people's ability to access the information they need, particularly where internet access is available. Searchable databases with user friendly interfaces (touch screens, pictures and audio along with text) are a convenient way for user to access knowledge on animal health. The information 'Kiosk' being piloted by Rajiv Gandhi College of Veterinary and Animal Sciences Pondicherry contains information on symptoms, causes, treatment of major diseases of cattle. The information contents were based on participatory appraisal regarding health knowledge and concerns of landless cattle owners in the area. Its touch screen (no mouse or key board, friendly graphics, animations, audio delivery of information and choice of languages) in Tamil and English are designed to minimize the difficulty faced by livestock keepers in using it and farmers are using it extensively for their benefit.

Nath *et al* (2003) developed computer software for efficient balanced formulation of feed for a wide variety of poultry birds. The program provided options for trouble shooting guidance in formulation of ration as well as exhaustive list of readymade ration, which could be used at the click of the mouse. It was simple, efficient and effective tool for formulation of rations which could be immensely helpful to poultry farmers, entrepreneurs, scientists, teachers and students alike.

Sweeny and Chiriboga (2003) designed the study on "Evaluating the effectiveness of a multimedia program on home safety". The purpose of the study was to test the effectiveness and acceptance of multimedia home safety programming by community dwelling seniors. A prototype CD-ROM was produced that included an audio narration of content and direction for operating the program on touch screen computer monitor. Volunteers (n=126) from senior centre, aged55 and older were randomly assigned to:

i. A multimedia group that used the interactive program to learn about home safety
ii. A traditional learning group that read well established booklets on home safety and
iii. A control group that received no instruction on safety between pre and post tests.

Repeatedly measured multivariable analysis of variance showed that the multimedia group improved its knowledge. The group was also very satisfied with the approach. They concluded that multimedia formats can effectively and economically provide information to older clients.

Jain (2005) developed and standardized media package on animal husbandry practices for rural women of Haryana and concluded that rural women who had large number of milch animals gained more knowledge and rural women who had cultivation as their major occupation, large land holding, high farm power and high material possession had favourable attitude towards animal husbandry practices after exposure to video cassette/CD. The impact of video cassette/CD was found to be significant for gain in knowledge and change in attitude of rural women.

Kadian and Gupta (2006) designed a Video Compact Disc (VCD) on dairy calf management practices and compared it with other methods of instruction i.e. lecture only, audio only and literature only. They found out that Video Compact Disc (VCD) can be used as an effective medium for dissemination of dairy calf management practices in order to increase the knowledge level of dairy farmers. Video Compact Disc (VCD) was also found to be more effective as compared to other three methods of instruction under study i.e. lecture only, audio only and literature only.

Vidya *et al* (2010) carried out a study to design, develop and test an educational interactive video DVD on dairy health management practices. A total of 60 dairy farmers owning DVD player and T.V. were selected by means of proportionate random sampling among the farmer members of four milk cooperatives societies in Kannur district of Kerala. The adoption level of 22 dairy health management practices was ascertained after exposure of the farmers to the interactive video-DVD. The study revealed that interactive video-DVD was an appropriate tool to disseminate knowledge on dairy health management practices. On exposure to the health care management practices through video DVD, all the respondents were convinced about the use of scientific management practices and all the respondents were willing to adopt the practices symbolically.

Asrani *et al* (2011) developed a documentary film on poultry farming entitled “Murgi Palan- Rozgar ek labh anek” employing a standard procedure i.e. planning,

scripting, recording, editing, mixing, time estimation, review and fine tuning steps. The developed film was tested for its effectiveness by subjecting it to twenty judges of subject matter specialists and extension specialists. Overall effectiveness of documentary film was rated as high to moderate by most of the judges with overall obtained weighted mean score of 2.71 as against maximum of 3.0, thereby indicating that the developed video-film on poultry farming was quite educative and informative for farmers.

Anuradha and Singh (2012) developed a Video Compact Disc (VCD) on post - harvest technology on food grains to disseminate knowledge to rural women of Rajasthan (India) on post- harvest technology of food grains and field tested it. Samples of 50 farm women were selected (25 each from two villages). Pre-post experimental research design was used for the investigation. The effectiveness of video program in terms of video quality, visual quality, presentation of message, content importance suitability and text was found to be relatively high. The overall effectiveness of video compact disc was also high. The developed video compact disc was found effective in educating the farm women because the message was simple, familiar, understandable and real. The farm women perceived and comprehended the message of video compact disc very well. The overall gain in knowledge through developed VCD was found to be statistically significant. Hence, developed video compact disc was found effective in educating the farm women.

Mallinga *et al* (2012) determined the effectiveness of CD lesson on the knowledge of milk vendors about clean milk production. The knowledge level of the respondents improved from medium to high before viewing the CD lesson to cent percent immediately after viewing the CD lesson. They further reported that the knowledge gain was 51.43 per cent in management, 32.33 per cent in animal shed maintenance and 32.08 per cent in milk storage and transport system. The CD lesson was found to be effective in disseminating knowledge about clean milk production practices among the milk vendors.

Sasikala *et al* (2012) conducted a study on effectiveness of multimedia compact disc (MCD) on dissemination of knowledge among the pig farmers in Kancheepuram district (Tamil Nadu) and found out significant difference with respect to mean knowledge scores of farmers at pre and post-exposure stages and the farmers

gained overall knowledge of pig farming practices about 32.56 percent. Moreover, the respondents acquired more knowledge on managemental practices of pig farming namely, castration of piglets, weaning age of piglets, age of docking, need of wallowing and duration of light required in pig houses. The results of the study clearly indicated the importance of MCD in transfer of knowledge on scientific pig farming practice.

Singh (2012) designed a multimedia application (CD-ROM) on Dairy Enterprise and tested its effectiveness and validation. The results showed that CD-ROM is one of the best learning and instructional device for new/budding farmers in modern context as the new generation learns easily from modern gadgets and can lead to systematic and sustainable growth of dairy sector. The pre and post exposure testing of the respondents indicated that there was sufficient impact of learning (change in knowledge) as well as learning of new things to them. Hence an educational interactive video-DVD on dairy enterprise can be considered as a good medium to disseminate knowledge on dairy management practices to the dairy farmers.

Meena *et al* (2014) developed an educational Digital Video Disk (DVD) on perceived needs of Improved Dairy farming Practices (IDFPs) and tested its effectiveness on ninety dairy farmers. The developed educational DVD was found effective in terms of knowledge gain about IDFPs among the dairy farmers by applying pre and post exposure knowledge test. Majority of the respondents were 'satisfied' regarding its usefulness in enhancing knowledge, suitability of the information to the field situation, improves self-confidence, arousal of curiosity and interest, relevancy and appropriateness of the content, completeness, credibility, simplicity and logical presentation of information.

Sireesha *et al* (2014) conducted a study on the extent of use of information and Communication technology (ICT) tools by various animal husbandry Organizations (n=33) in Andhra Pradesh and reported that the Educational and Research Organizations like NIRD (National Institute of Rural Development), NAARM (National Academy of Agricultural Research Management) were using Multimedia CDs for institutional purposes in various training programmes. NRC (National Research Centre) on Meat, VBRI (Veterinary Biologicals Research Institute), Indian

Immunologicals, CRIDA (Central Research Institute for Dryland Agriculture) made use of Multimedia CDs mostly during presentations in training to their personnel's and on need basis for giving training to the farmers. Multimedia CDs were being used by the faculty of SVVU (Sri Venkateswara Veterinary University) mostly for imparting knowledge and skills in teaching to the students in their respective disciplines and also used during training programmes of farmers. Among the Non Governmental Organizations and Cooperative Organizations, ANTHRA used Multimedia CDs daily for their activities while WASSAN (Watershed Support Services and Activities Network) indicated to use the same on need basis for the purpose of educating and enlightening farmers on various issues. Summarily, Multimedia CDs were being used by 40% of Service Providers, 50% of Financial Organizations, 87.5% of the Educational and Research Organizations, 66.6% of Non Governmental and 40% of the Private Organizations for various purposes like teaching, training, and business purposes.

These earlier studies related to use of various audio visual instructional materials revealed that they are an excellent instructional material to be used by teachers, trainers of trainees and trainees itself. So, there is need and scope for development of such educational tools and devices in different fields/aspects of livestock rearing.

2.2 PROFITABILITY OF DAIRY FARMING VIS A VIS AWARENESS LEVEL OF FARMERS

Singh and Thomas (1992) reported that the state of Punjab produced about 11% of total milk production in country and there was considerable scope for milk production. They listed the various constraints for higher milk production and mentioned efficient transfer of technical knowledge by provision of extension services, as one of remedies to do away with them.

Kilpatrick (2000) revealed that the education and training enhanced farmers' ability and willingness to make successful changes to their dairy management practices. Education of the farmers thus has an impact on the profitability of the dairy venture.

Kala *et al* (2001) estimated the fixed and variable cost of different dairy units headed by women. They found that average net return of dairy enterprise was Rs.

6362.84 per month, which reflected the earning of the entrepreneurs. They also calculated the cost benefit ratio and concluded that investment in dairy enterprise was quite economically viable and suitable for women.

Sah (2002) in his study reported that maximum percentage of dairy farmers and farm women perceived medium level of information needs related to improved practices and concluded that for the success of any dairy development programme, it is imperative that it should address to the needs of the clientele.

Thusoo *et al* (2005) conducted a study in two districts namely; Gurdaspur and Jammu, representing the semi hilly tracks in north India with a view to examine the existing resource use and production patterns on the different farm sizes assess the comparative profitability of crop raising and dairying. The crop-dairy enterprise mix was found to increase the returns on all size of farms. The higher incomes were obtained from dairy with higher employment. Dairy farming is one of the enterprises under prevailing conditions, which is successfully and profitably complimentary to the crop enterprises.

Gill *et al* (2008) conducted a study to determine the profile of dairy farmers and awareness level of 150 dairy farmers from Ludhiana district of Punjab, on the recommended dairy practices such as animal breeding, feeding, health care and management of animals. Results revealed that the awareness in animal breeding practices was low in record keeping of farms. Awareness in animal health care such as vaccination, milk testing and care during mastitis infection was also low. Further it was recommended that institutional and non institutional dairy training programmes and other measures should be implemented to improve awareness level of dairy farmers.

Patil *et al* (2009) revealed that majority of the respondents (78.67%) did not know the necessity for the separate housing of pregnant animal before 2-3 weeks prior to parturition. About 73.78% of the respondents did not know about the drying off animals before parturition. Also 52.89% of the respondents were unknown about allowing extra concentrate ration in last trimester of pregnancy.

Saha *et al* (2010) in his study revealed that farmers without having adequate knowledge on scientific practices are practicing many malpractices and believe in

superstition which leads to failure of the venture. They also reported the awareness level of farmers varied from 6.25 percent to as high as 84.1 percent.

After reviewing the previous research studies on dairy farming, it can be concluded that profit from dairy enterprise can be enhanced by increasing the awareness level of the farmers about various diseases and correct managemental practices. This will help in the reduction of various production losses occurring at a farm and will enhance its profitability.

2.3 INCIDENCE AND AWARENESS OF FARMERS ABOUT COMMON REPRODUCTIVE PROBLEMS

Kaikini *et al* (1976) revealed incidence of abortion and stillbirth to be 1.5 percent and 2.3 percent respectively among Murrah buffaloes in Maharashtra. Similarly, Singh (1991) conducted a survey on incidence of reproductive disorders in bovines in Punjab. They found out the overall incidence of reproductive disorders to be 16.69 percent. 8.71 percent of these disorders were constituted by abortion in pregnant animals.

Mehrotra and Dey (1998) surveyed the incidence of abortion in exotic and crossbred cows in temperate regions of Himalayas. They reported the incidence of abortion in H.F. and its crosses with Haryana as 8.34 percent. The pluriparous animals suffered more abortions as compared to primiparous animals. Majority of abortions were accompanied by retention of placenta.

Murugeppa and Dubey (1998) studied the incidence of reproductive disorders in 292 pregnant Surti buffaloes. They reported incidence of reproductive disorders during pregnancy and parturition to be 21.06 percent. A good number (22.12 %) of these disorders were constituted by abortion and 25.21 percent by stillbirths.

Meena (2000) stated that majority (74.00 %) of farmers had medium level of knowledge about reproductive traits. Farmers had highest knowledge (65.33 %) about gestation period of cattle and buffalo followed by age of maturity (53.79 %) and had least knowledge (46.33 %) about days required after conception for pregnancy diagnosis. The overall knowledge about reproductive traits was 59.54 percent.

Singh (2001) conducted a study in Haryana and reported that the knowledge of small, medium and large farmers about unsuccessful gestation (abortion) was 26.70 percent, 36.70 percent and 48.70 percent respectively.

Atwal *et al* (2002) reported the incidence of reproductive disorders in buffaloes in seleniferous areas of Punjab. They found out the overall incidence of reproductive disorders to be 64.01 percent. Out of these, 9.34 percent were attributed to abortion.

Dua (2003) in a study of 802 female cattle and 2316 buffaloes examined over a 6-yr period, reported the incidence of reproductive disorders as anoestrus (43.0% and 55.5%), repeat breeding (35.3% and 12.8%), retained placenta (6.4% and 4.7%), genital prolapse (3.61% and 12.1%), dystocia (3.5% and 8.3%) and abortion (2.6% and 3.1%) respectively.

Singh (2004) estimated the economic losses due to diseases in dairy animals in Amritsar district of Punjab state. The maximum morbidity losses were found to be caused by anoestrus, repeat breeding and abortion. The maximum mortality losses were caused by accidents, rabies and tick-borne fever.

Siddiquee *et al* (2007) surveyed the incidence of reproductive disorders in camps organized in different parts of North Gujarat. The majority of animals were suffering from anoestrus, repeat breeding, uterine infection and abortion. In buffaloes, the incidence of anoestrus, repeat breeding, uterine infection and abortion was recorded as 41.49, 10.64, 7.4, 1.06 and 1.06 percent respectively.

Khan (2008) revealed that the incidence of repeat breeding, endometritis, pyometra, anoestrous, abortion, dystocia and retention of placenta was 16.97 percent, 11.85 percent, 10.62 percent, 7.10 percent, 1.52 percent, 1.23 percent and 1.04 percent respectively among Murrah buffaloes.

Rabbani *et al* (2010) reported incidence of repeat breeding, anestrous, genital prolapse, abortion, retained placenta, uterine torsion and dystocia 15.69 percent, 9.74 percent, 7.73 percent, 5.99 percent, 2.58 percent, 2.39 percent and 2.06 percent among buffaloes in Pakistan respectively.

Chand (2011) revealed that farmers were having highest knowledge about abortion (78.98 %) followed by repeat breeding (71.44 %), anoestrus (70.56 %), late maturity (68.08 %), retention of placenta (57.85 %), dystocia (52.94 %) prolapse (47.06 %) in Alwar district of Rajasthan.

Dhindsa *et al* (2014) conducted a study on the incidence of various reproductive disorders viz. anestrus, repeat breeding, prolapse of genitalia, dystocia,

retention of placenta, metritis, difficult detection of estrus and abortion in four villages of Fatehgarh Sahib district of Punjab. They reported the incidence of abortion as 4.3 and 2.0 per cent in buffaloes and cows respectively. They also emphasised on the need to be formulate appropriate strategies and doing efforts to optimize reproductive efficiency of the animals in the area.

The reports indicate that abortion is one of the important reproductive problems faced by the dairy farmers in Punjab. Any instructional device will certainly help the farmers by enhancing their awareness level about various aspects including causes, management, control and preventive measures against abortion in dairy animals and also acting smartly as per the need. This will help to enhance the productivity and profitability of the dairy farming in the long run.

CHAPTER III

MATERIAL AND METHODS

This chapter deals with the basic methodology followed for designing the CD-ROM for awareness about abortion in dairy animals and testing its effectiveness. The whole research procedure followed has been explained under following sub heads:

3.1 Designing of CD-ROM

3.1.1 Selection of topic

3.1.2 Development of manuscript

3.1.3 Delivery mode of the manuscript/content

3.1.4 Script for multimedia application

3.1.5 Multimedia elements

3.1.6 Designing of screen

3.1.7 Development of raw type CD-ROM

3.2 Testing and validation of CD-ROM

3.2.1 Development of score key for performance of learners

3.2.2 Testing of CD-ROM

3.2.3 Statistical analysis of data

3.2.4Validation of CD-ROM

3.3 Modification for final CD-ROM

3.1 DESIGNING OF CD-ROM

3.1.1 Selection of topic

It has been well documented that livestock rearing has significant positive impact on equity in terms of income, employment and poverty reduction in rural areas as well as for improving the health status of the soil. Since it is always risky to have one source of income, dairying helps in having an alternative source of income to the farmer. Reproduction is the basic consideration in the economics of dairy farming. A healthy calf each year is the ultimate goal for the success of dairy farming. This is possible by increasing the reproductive efficiency or breeding efficiency of the animals. The main reasons for the low reproduction in bovines are late maturity, poor

expression of oestrus, anoestrous, low conception rate, repeat breeding, abortion, still birth etc. Proper knowledge regarding the causes, preventive measures and good management practices help the farmers to bring these disorders to negligible level. Multimedia plays an important role in the dissemination of scientific technologies to bridge the knowledge gap of the rural farmers. The audio visual aids are best suited for efficient and comprehensible delivery of message to the learners. Keeping this in mind, a new and popular form of resource material (CD-ROM) has been designed and developed to help the farmers learn about causes, pathogenesis, control & prevention and correct management practices to prevent the abortion in dairy animals. This can help the farmers to further increase their profits from dairy farming through managing the said problem.

3.1.2 Development of manuscript

i. Importance of topic:

For a dairy farmer, pregnant animal is the biggest asset. It is the promise of returns on the investment made by the farmer. The successful recovery of these returns is dependent on the normal parturition of the animal delivering a healthy calf at full gestation. Abortion is one problem, which can put dairy farmer into great trouble. The economic losses due to abortions occur in two forms- direct and indirect. Direct losses include value of foetuses lost. Indirect losses include those associated with establishing the diagnosis, re-breeding cows that aborted, possible loss of milk yield, and replacement costs if cows that aborted are culled. Thus loss of pregnancy represents a significant loss of (potential) income to the producer and appropriate action should therefore be taken to prevent abortions and to investigate the cause of abortions that has occurred. Certain infectious causes of abortion, being zoonotic in nature, also pose serious threat to the dairy farmers/animal handlers. Thus increased awareness about abortion in dairy animals will help the farmers in multiple ways.

ii. Common terminology related with abortion in dairy animals:

Gestation period: the period from successful conception (natural mating or artificial insemination) to parturition (giving birth to young ones) is called gestation period. For buffaloes its 310 days (± 10 days) and for cattle 270 days (± 10 days).

Trimester: a period of 3 months. The total gestation period can be divided into three trimesters. First, second and third trimester.

Early embryonic mortality: the death and loss of the embryo until up to 42 days of pregnancy when differentiation and implantation has occurred. The losses after day 42 are called foetal losses.

Still birth: delivery of dead foetus at full term gestation is called still birth.

Premature birth: the expulsion of foetus before completion of full term gestation which is capable of independent life. Such calves are born weak but can be reared well with good management and providing extra care.

Abortion: the expulsion of foetus before completion of full term gestation which is incapable of independent life.

iii. Various causes of Abortion: Abortion is a multi – etiological disease condition and its causes can be categorised into two types i.e. Infectious and Non- infectious.

A) Infectious causes: caused by the micro – organisms.

1. Bacterial causes:	**Specific:** Brucellosis, Leptospirosis, Listeriosis, Vibriosis, Mycobacterium etc. **Non-specific:** Streptococci, E.Coli, Pseudomonas, Corynebacterium, Hemophilus, Pasturella etc.
2. Viral causes:	**Specific:** IBR- IPV, Epizootic Bovine Abortion etc. **Non-specific:** Foot and Mouth Disease, BVD-MD, Parainfluenza, Pseudorabies, Blue Tongue etc.
3. Protozoal:	Trichomoniasis, Trypanosomiasis, Neosporiasis, Anaplasmosis, Babesiosis etc.
4. Fungal:	Aspergillus, Yeast, Absidia etc.

B) Non - infectious causes: causes other than micro – organisms.

1. Chemicals:	Nitrates, Pesticides, Oxalates, Fluorides, Lead, Arsenic poisoning
2. Poisonous plants:	Pinus, Lantana, Locoweed, Sweet Clover Hay
3. Nutritional:	Starvation, vitamin A deficiency, iodine deficiency, mouldy feed
4. Hormonal:	Increased Esrogens level, steroids administration, progesterone deficiency, PGF2α administration
5. Allergic:	Faulty vaccination, mismatched blood transfusion, anaphylactic shock, high environmental temperature
6. Physical causes:	Douching of pregnant uterus Manual rupture of amniotic vesicles Insemination of pregnant animal Removal of corpus luteum Uterine torsion Torsion of umbilical cord Transportation stress Surgical stress Rupture of amniotic vesicle Rupture of foetal heart and blood vessels
7. Miscellaneous:	Twinning, maternal anaemia, less number of uterine caruncles, uterine adhesions to wall, threatening of pregnant animals, habitual abortions

The occurrence of an infectious abortion at a dairy farm can poses serious threat of transmitting the agent to other healthy animals. So, the careful management of the occurred abortion is necessary to contain the disease and restrict further losses.

iv. What to do if an abortion occurs at your dairy farm:

1. Identify and isolate the aborting animal from rest of the herd.
2. Report the abortion to the surrounding civil veterinary hospital or dispensary. Consult your veterinarian immediately for guidance and sample collection. He may collect certain samples for final confirmation of the cause.
3. Properly dispose off the aborted foetus, placental membranes through burial method. Never touch the aborted material with bare hands. Always Use gloves/ sleeves for this purpose.
4. Wash the whole dairy premises with water and then disinfect with phenyl or some other strong disinfectant.
5. Submit suspected feed and water samples for laboratory diagnosis of the cause.
6. Segregate the aborted animal under observance and consult the vet.
7. Submit blood samples from animal for diagnostic purposes. Also submit the blood samples of the person handling the aborting cow. This will help in diagnosis of zoonotic disease if any.
8. When animal is declared positive for brucellosis, do not use it for future breeding and cull that animal.
9. Follow the measures suggested by the veterinarian which may be nutritional rectifications, medication, vaccination, culling and change in managemental practices.

As implied from an old adage, "Prevention is better than cure", the dairy farmer should aim at avoiding the occurrence of abortion in pregnant animal. This can be achieved only if the farmers have basic knowledge of various abortifacients, their spread route, control and prevention measures.

v. Following is the list of preventive managemental practices which need to be adopted by the farmer to avoid occurrence of abortion in his farm:

1. Scan the breeding history and other records of the animal to be purchased, if possible.
2. Always purchase animals from some good and well managed farm. Select the milch animal in second lactation with no history of reproductive disorder. The history of animal about vaccination, diseases occurrence, and production

record should be procured. One can go for the blood testing, physical examination and gynaecological check up of the animal done before purchase.

3. Always quarantine the newly purchased animal at least for 10 days before its mixing with the rest of herd. Observe the animal for few days for any signs of illness if any occur. Only after full check up animal should be introduced into the herd.

Follow the proper vaccination schedule for dairy animals with the advice of veterinarian. Vaccination against Brucellosis should be done only in female calves of 4-8 months of age with 'Bruvax Delta' vaccine. The vaccine is not to be used in the male animals. The important points to be kept in mind during vaccination are listed as:

Vaccination tips:

i) Maintain cold chain of the vaccines until final administration to the animal.
ii) Always store the vaccine vials at 4^0C. Do not freeze.
iii) Vaccinate all the animals of the herd at a single instance.
iv) Avoid exposure of the vaccine to direct sunlight.
v) Always use sterilized needle and syringe or disposable syringe and needle for the vaccination.
vi) Right dose, right time and right route of vaccination ensure the success of vaccination.
vii) Maintain vaccination record of the animals for future reference.
viii) Animal should be healthy for vaccination. Sick, emaciated and worm infested animals should not be vaccinated.

4. Deworming of the animals should be done at the interval of about 6 months in March and October with the advice of veterinarian.
5. The floor of animal shed should be rough and non slippery. The skidding of the pregnant animal may induce abortion in it.
6. Provide balanced ration to the animals. The ration should have adequate proportions of carbohydrates, proteins, fats, vitamins and minerals. The deficiency of one or other may result in abortion of pregnant animals.
7. Don't store animal feed (concentrates) for more than 15 days. Store feed bags in an airy space. In rainy season, avoid storing of the feed bags on the bare

ground. Use some platform (half to one foot high) so that there is no seepage of moisture into the bags.

8. Adopt artificial insemination because natural mating can transmit infectious agents from infected male to the healthy female animals which later on result into abortion.
9. Go for pregnancy diagnosis of the inseminated animal from vet after 2-3 months of insemination. The douching or insemination of the pregnant animal can lead to abortion.
10. Have knowledge and avoid using of poisonous plants even in animal beddings. Some of them are: Lantana (Lal Phoolnoo), Locoweed, Pinus etc. Sometimes Wheat, Berseem, Barley or other crop may be infested with fungus and on ingestion by the animal may cause abortion.
11. Some plants like Alfa-Alfa, Cabbage and Turnips have compounds similar to hormones. Don't use them in feeding of pregnant animals.
12. Avoid stress to the pregnant animal. Provide good ventilation in the animal sheds. The frightening, beating or long journey of the pregnant animal at single stretch may cause abortion. Transportation in tractor trolley is direct invitation for abortion.
13. Consult the veterinarian before any kind of medication of the pregnant animal. The medicine given for any other ailment can become the cause of abortion.
14. Clean the manger and watering troughs weekly or fortnightly. In absence of that fungus may grow and lead to abortion.
15. Dry off the pregnant animal about 60 days before completion of full term. Instil intra mammary medication into each teat after milking.
16. Segregate the pregnant animal from rest of the herd about 10 days before expected date of calving. Provide *ad lib* feeding and extra care to them.
17. Maintain all the records of the dairy farm including introduction of new animals, vaccination, disease conditions, insemination etc. Good record keeping systems will help to monitor the abortion trends and will assist in diagnosis of the problem.

3.1.3 Delivery mode of the manuscript/content

The original theoretical content of the manuscript were paragraph type which would not have captured the suitable interest of users and purpose for the motivational learning for adopting correct managemental practices could not had been achieved. Therefore the whole information was prepared as logical sequence. The main feature of instructional modules was as:

- Text was written in an easy and interactive mode to motivate the learners, to keep continuity without the need of the instructor like a self learning module.
- Visuals were added wherever needed to make the learning process more easy and effective.
- Tables and bold column messages for easy learning and understanding.

3.1.4 Script for multimedia application

The script was developed before final setting of text, table, graphic, illustrations, sound and video elements. The script was developed by making the blueprint for the requirement of graphics, video, animation etc. as per requirement of the content. After finalising the topic, storyboards were prepared in a logical sequence of information. The screen wise description of sequences of text along with illustration, tables, stills (depiction), video, visuals and sound tracks were mixed and set in order.

Format of script writing

Screen No.	Still/Video	Screen /Description	Audio Voice

3.1.5 Multimedia elements

All the multimedia elements i.e. text, graphics, audio, videos etc were developed separately as per requirements of the developed story board contents.

i. Text development

The typing of the text was done with the use of micro-soft office word software.

ii. Development and selection of graphic illustration

Graphic illustrations are the representation made by drawing, painting or photographs which make the visual communication of the ideas contained

within it. The graphics were produces by clicked photos, scanning of photographs, slides and textbooks or internet source.

iii. Video clippings

Video clippings are the real time shots of any object or process. They make the learning process more emphatic and arouse learner's interest in learning. Video recordings were done according to the already prepared manuscript and storyboard. Digital and mobile cameras were used for video clippings which were transferred on to computer in digital file form. Videos stored were edited according to the need of manuscript. To maintain the attention of learner, we have used short video sequences. Slider was used in Video to control the running of movie according to the need of the learner. Video shooting was done in University dairy farm, teaching veterinary clinical complex, private dairy farms and from the reported field cases.

iv. Development of audio files

Sound is an important component of video film/movie and it greatly enhances the interest of the viewer. The audio element of the video commentary and background narration were recorded in vernacular language i.e. Punjabi. The audio files were synchronized with text and video. Background music was also inserted with text to make light mode learning and to break the monotony.

3.1.6 Designing of screen

After the development of multimedia elements, the screen designing was done by using background colours and design for brightness, helping in easy understanding and learning by the learners.

3.1.7 Development of raw type CD-ROM

Multimedia instructional CD-ROM for awareness about abortion in dairy animals was developed with the basic aim as an instructional soft form resource material for wider use by the dairy farmers/ learners. After using different software for creating the multimedia files, editing and integration, the raw CD-ROM was prepared. Various computer softwares were used for the purpose of video editing, audio editing, synchronization and other effects.

Table 1: List of different software used in development of CD-ROM

Software	Function
Adobe Premier CS-5 Pro.	Video Editing
Sony Sound Fonge-10	Audio Editing
Adobe Premier CS-5 Pro.	Animation
Adobe Photoshop	Photos And Special Effects

3.2 TESTING AND VALIDATION OF CD-ROM

3.2.1 Development of score key for performance of learners

A score key was prepared to assess the performance of the learners before and after viewing the CD-ROM.

Table 2: Score key for ranking performance of the respondents before and after viewing the CD-ROM

Score Range (out of 50)	Performance
45-50	Excellent
35-45	Very good
25-35	Good
0-25	Poor

3.2.2 Testing of CD-ROM

A questionnaire was prepared covering different aspects of abortion in dairy animals and all related knowledge was provided in the prepared CD–ROM. The questionnaire consisted of 50 questions each of one mark. The questions were grouped into two parts. First half contained questions related to general terminology and causes of abortion in dairy animals. The other half of the questionnaire had questions related to management, control and prevention measures to be adopted for avoiding occurrence of abortion in dairy animals. Sixty eight respondents were tested for their knowledge on abortion in dairy animals, before and after exposure to the

CD–ROM. The results were collected, organised into tables for statistical inferences and to know the impact of learning through developed CD- ROM.

3.2.3 Statistical analysis of data

The scores obtained by the respondents before and after exposure to the CD–ROM were calculated. Mean of the scores before and after exposure to the CD–ROM was calculated. Percentage analysis of change in scores was done to calculate the impact of learning. Also, the socio economic characteristics of the respondents were analysed statistically. Further, Student's't' test (for paired observations)was applied to test the significance of the difference in the score of the respondents and to statistically validate the results. The null hypothesis considered no significant difference in mean scores of the respondents before and after exposure to developed CD–ROM. Computer based SPSS data editor Version 16 was used for all the statistical operations.

3.2.4 Validation of CD-ROM

CD-ROM developed on abortion in dairy animals was validated after development, as follows:

i. The contents were validated by the subject matter experts of the department of Veterinary and Animal Husbandry Extension Education and Veterinary Gynaecology and Obstetrics.
ii. The validity of the working script along with the graphic illustrations including photographs, illustrations, line drawing was done by experts from department of Veterinary and Animal Husbandry Extension Education.
iii. Multimedia elements used in the CD-ROM were evaluated by faculty of department of Veterinary and Animal Husbandry Extension Education and subject matter specialists, using a marking scale out of 4 (Singh, 2012).
iv. Thereafter, an overall rating score (out of 4) based on the four attributes was given to the prepared CD-ROM.

3.3 MODIFICATION FOR FINAL CD-ROM

CD-ROM was then modified on the basis of suggestions of experts after validation. The advised corrections were accordingly made and final CD-ROM was prepared for henceforth use.

CHAPTER V

RESULTS AND DISCUSSION

The results of the study carried out have been described under the following headings:

4.1 APPROPRIATENESS OF MULTIMEDIA ELEMENTS USED FOR DESIGNING THE CD-ROM

4.2 EFFECTIVENESS OF THE DEVELOPED CD-ROM FOR KNOWLEDGE GAIN AMONG THE FARMERS

4.3 FINAL RATING OF CD-ROM

4.1 APPROPRIATENESS OF MULTIMEDIA ELEMENTS USED FOR DESIGNING THE CD-ROM

Multimedia elements of a video are the various components like audio, video, stills, developed graphics and various other depictions etc. which are rendered in specific sequence and manner to produce a meaningful message for the viewer and audience. The better quality and efficient execution of the multimedia elements of a video based instructional device determine its success in achieving target of effective delivery of message. The appropriateness of the multimedia elements was evaluated on 18 attributes by the subject matter experts. The attributes were related to text, visuals, videos, graphics and audio used in the CD-ROM. These attributes included font size and colour, illustrativeness and sharpness of visuals, clarity, rationality and duration of video, complexity and appealing value of graphics, pronunciation speed, pause, emphasis, synchronization and background music/voice of audio used in CD-ROM. The results regarding the appropriateness of multimedia elements used for CD-ROM have been presented in Table 3.

Table 3: Measures of Appropriateness of Multimedia Elements for CD-ROM on Abortion in Dairy Animals

Sr. No.	Multimedia Elements	Mean Score (out of 4)
Content/Text		
1.	Font Size	3.8
2.	Font Colour	3.7
Visuals/Stills		
3.	Illustrativeness	3.9
4.	Sharpness	3.6
5.	Placement	3.7
6.	Rationality	3.8
Videos		
7.	Clarity	3.8
8.	Rationality	4.0
9.	Duration	3.7
Graphics		
10.	Complexity	3.5
11.	Rationality	3.7
Audio		
12.	Rationality of Manuscript	3.9
13.	Pronunciation	3.8
14.	Speed	3.6
15.	Pause	3.7
16.	Emphasis	3.7
17.	Synchronisation	3.9
18.	Background Music	3.6

The mean score of different aspects of multimedia elements as judged by experts ranged from 3.5 to 4.0, with an average of 3.74 out of 4. The maximum individual score (4.0) was assigned to rationality of videos followed by audio rationality of manuscript and synchronisation (3.9). The minimum score of 3.5 was obtained by complexity of developed graphics used in the CD-ROM.

Table 4: Mean Score of Multimedia Elements

Sr. No.	Multimedia Elements	Mean Score (out of 4)
1.	Content/Text	3.75
2.	Videos	3.83
3.	Visuals/Stills	3.75
4.	Graphics	3.6
5.	Audio	3.74
	Overall Mean Score	**3.74**

The results showed that the mean scores of all the multimedia elements were more than 90 percent. Contents / text attributes score averaged 3.75 (93.75%) while videos scored 3.83 (95.75%). Attributes of still photographs had average score of 3.75 (93.75%), graphics scored 3.6 (90%) and audio attributes got 3.74 (93.5%) score. The overall mean score of 3.74 (93.5%) assigned to all the multimedia elements, proved that developed CD-ROM possessed all the qualities of a standard video based instructional device.

Similar results were observed by Singh (2012) who designed a CD-ROM on dairy enterprise and reported that mean score of the multimedia elements as rated by the subject matter experts was 3.67. The developed CD-ROM was found to be an effective instructional device for dissemination of the required information.

4.2 EFFECTIVENESS OF THE DEVELOPED CD-ROM FOR KNOWLEDGE GAIN AMONG THE FARMERS

The prepared CD-ROM was tested for its effectiveness by pre and post exposure knowledge test of 68 randomly selected farmers belonging to different areas of Punjab. Out of 68 respondents, 6 were females and rest were males.

4.2.1 Socio- Personal characteristics of Respondents:

A) Age profile of Respondents

Sr. No.	Age Groups (Yrs)	Number of Respondents (%)
1.	Less than 25	33 (48.5)
2.	25-40	26 (38.2)
3.	40-60	9 (13.3)
4.	More than 60	0 (0.0)

The majority of the respondents fell into young age groups i.e. 86.7% of the respondents were less than 40 years of the age (Fig. 1). This indicates the increased adoption of dairy farming as a profession by the youth of the state.

B) Educational Status of Respondents

Sr. No.	Qualifications	Number of Respondents (%)
1.	Illiterate	0 (0.0)
2.	Up to 8^{th}	8 (11.8)
3.	Higher Secondary	38 (55.9)
4.	Graduation	20 (29.4)
5.	Post Graduation	2 (2.9)

The majority of the respondents (67.7%) were having education up to higher secondary school level. 29.4% of respondents had studied up to graduation level while 2.9% were having post graduate qualifications (Fig. 2).

C) Family type of Respondents

Family type	Number of Respondents (%)
Joint	43 (63.2)
Nuclear	25 (36.8)

63.2% of the total respondents were members of the joint families while rest of the 36.8% were having nuclear families (Fig.3).

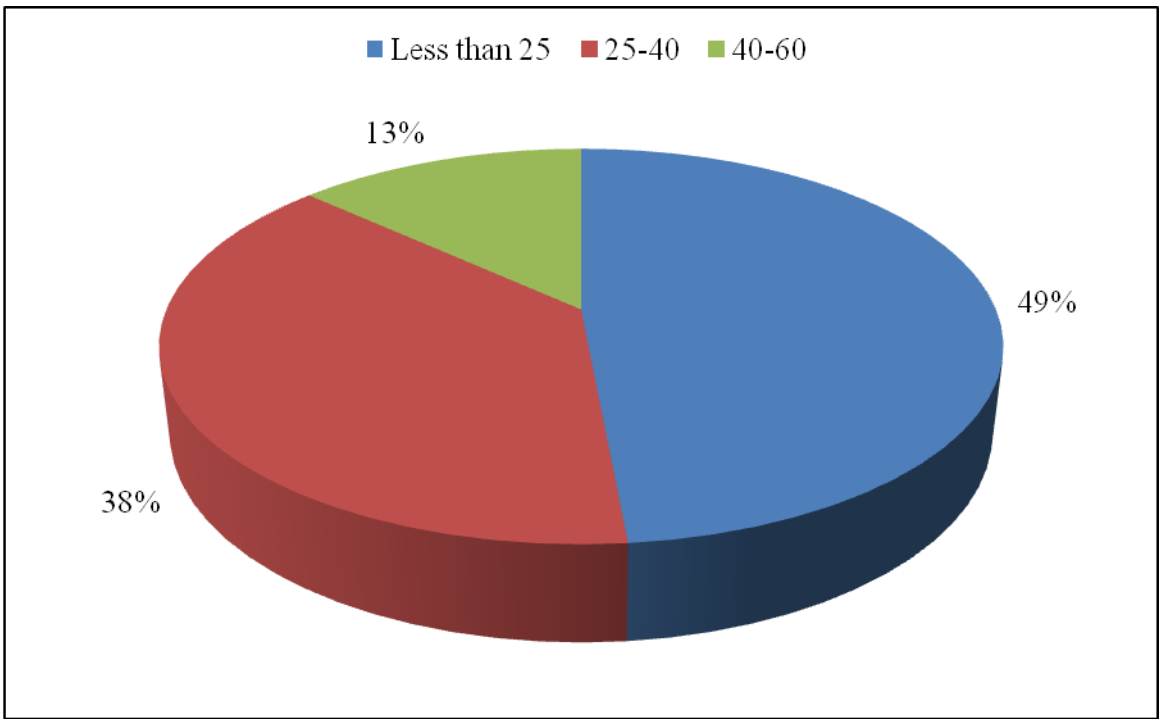

Figure 1: Age Profile of Respondents (Yrs)

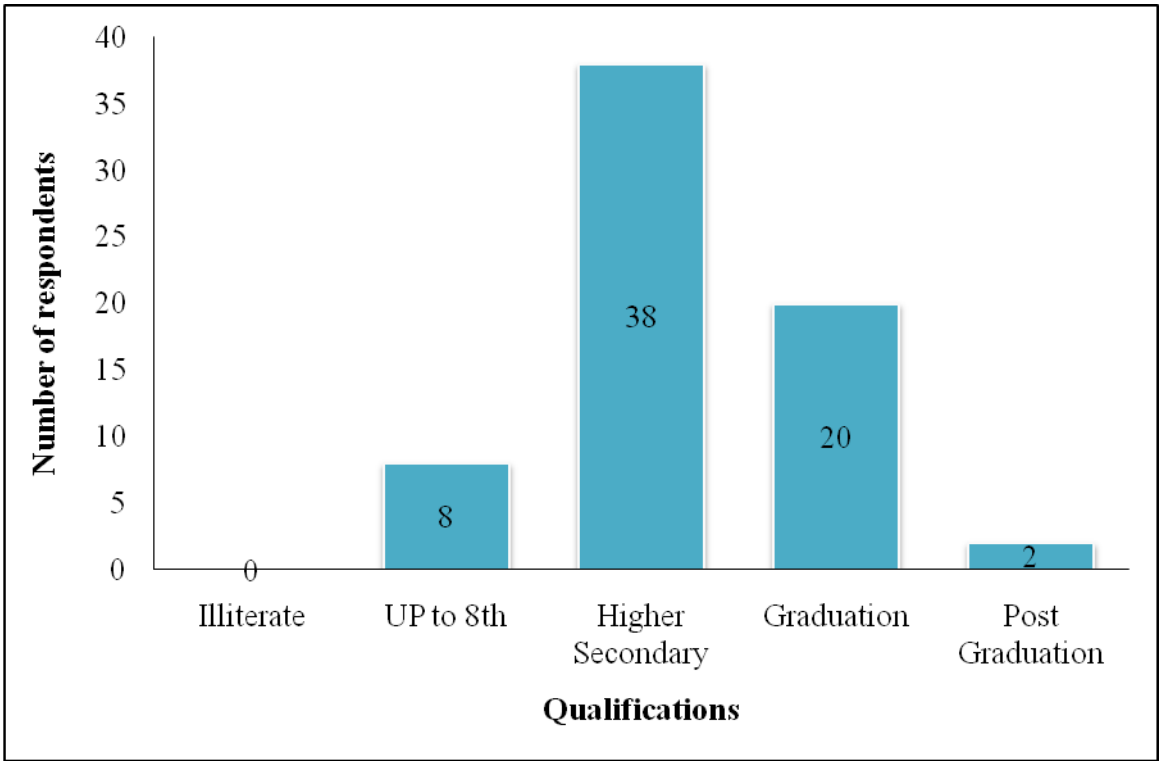

Figure 2: Education Level of Respondents

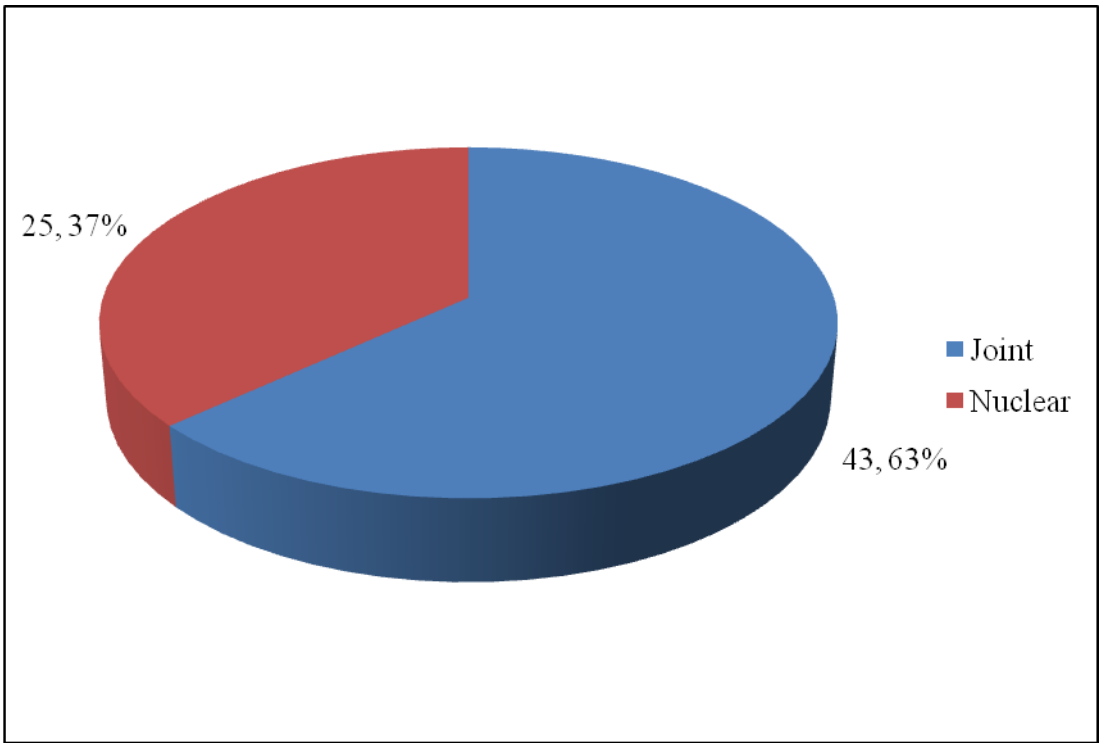

Figure 3: Family Type of the Respondents

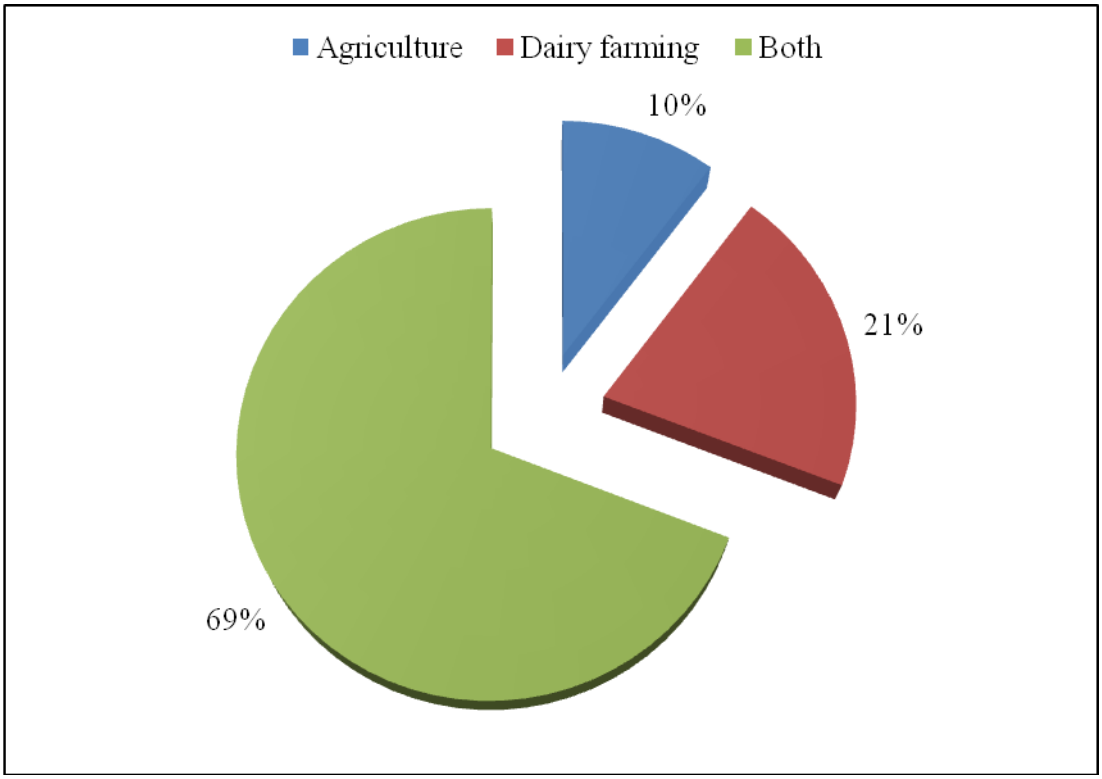

Figure 4: Occupation of the Respondents

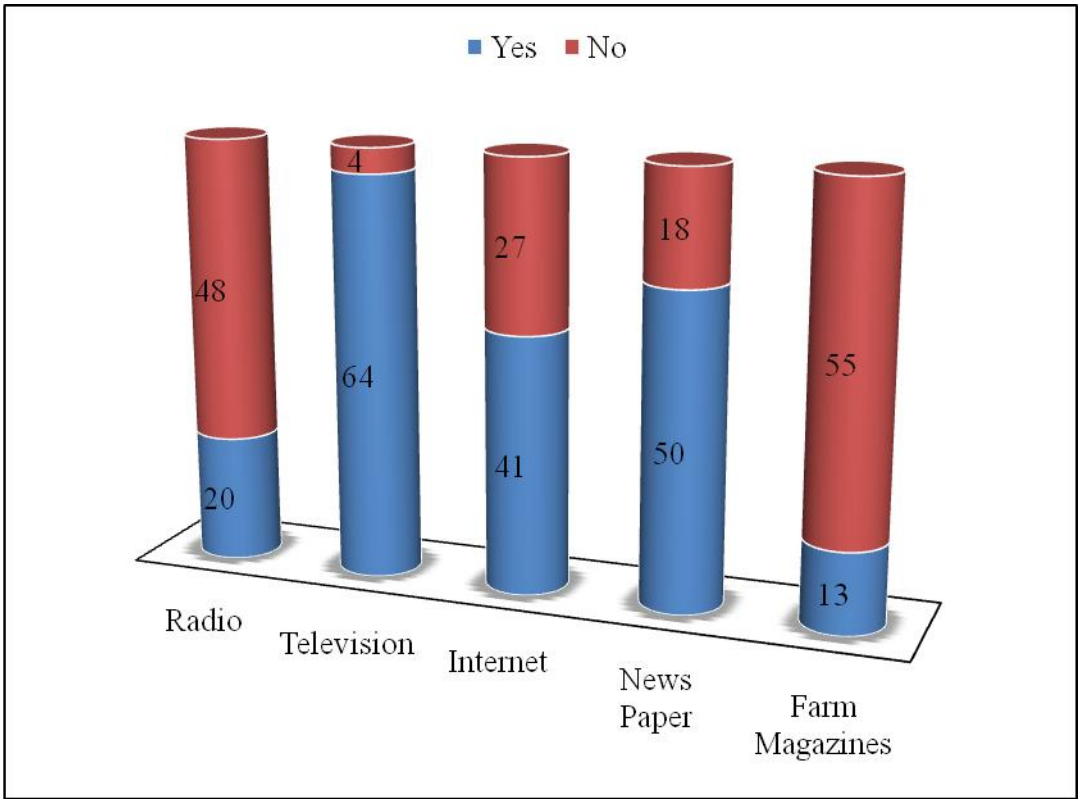

Figure 5: Mass Media Exposure of the Respondents

D) Occupation of the Respondents

Occupation	Number of Respondents (%)
Agriculture	7 (10.3)
Dairy Farming	14 (20.6)
Both	47 (69.1)

Mixed faming comprising of agriculture with dairy farming, was being practised by majority (69.1%) of respondents followed by 20.6% doing dairy farming only and 10.3% were agriculture farmers who were venturing into dairy farming sector (Fig. 4).

E) Mass Media Exposure of the Respondents

Sr. No.	Media	Number of Respondents using (%)
1.	Radio	20 (29.4)
2.	Television	64 (94.1)
3.	Internet	41 (60.3)
4.	Newspaper	50 (73.5)
5.	Farm Magazines	13 (19.1)

Television was found out to be the mass media source followed by highest majority (94.1%) of the study group followed by newspaper (73.5%), Internet (60.3%), radio (29.4%) and farm magazines (19.1%) as shown in Fig. 5.

4.2.2 Increase in Knowledge about terminology and various causes of abortion:

The gain in knowledge about terminology and various causes of abortion after exposure to developed CD-ROM is depicted through difference in initial and final score (Table 5).

Table 5: Initial and final score of the respondents about general terminology and various causes of abortion

Sr. No.	Initial Score (Out of 25)	Final Score (Out of 25)
1	16	22
2	11	23
3	4	18
4	3	17
5	9	19
6	13	22
7	10	21
8	8	19
9	9	23
10	12	23
11	15	24
12	15	23
13	7	18
14	13	24
15	15	23
16	8	19
17	10	20
18	13	25
19	6	21
20	10	22
21	10	23
22	4	20
23	16	23

Sr. No.	Initial Score (Out of 25)	Final Score (Out of 25)
24	15	22
25	17	24
26	18	25
27	17	21
28	16	23
29	11	21
30	18	25
31	10	22
32	13	24
33	12	23
34	12	22
35	14	21
36	13	24
37	5	20
38	14	21
39	11	23
40	10	22
41	17	25
42	15	24
43	19	25
44	10	22
45	5	21
46	10	19
47	13	22

Sr. No.	Initial Score (Out of 25)	Final Score (Out of 25)
48	20	25
49	18	24
50	11	19
51	12	21
52	16	23
53	19	24
54	18	23
55	11	22
56	9	18
57	10	18
58	5	17
59	12	19
60	7	21
61	12	20
62	14	24
63	12	20
64	11	23
65	9	21
66	13	24
67	15	23
68	14	24
Mean Score	**12.06**	**21.85**

The initial score of the respondents about terminology and various causes of abortion varied from 3 to 20 with a mean score of 12.06 ± 0.485 (S.E.), while the final score after exposure to instructional device ranged from 17 to 25 with a mean score of 21.85 ± 0.260. Thus, the average increase in score amounted to 9.80 ± 0.341 which represented 81.18 % knowledge gain. The results are also represented through graph in Figure 6.

4.2.3 Increase in Knowledge about Control and Preventive measures of abortion:

The initial and final score of the respondents in questions related to knowledge about management, control and preventive measures of abortion before and after exposure to developed CD-ROM was recorded as in Table 6.

Table 6: Initial and final score of the respondents about control and preventive measures of abortion

Sr. No.	Initial Score (Out of 25)	Final Score (Out of 25)
1	8	20
2	13	21
3	6	19
4	7	19
5	12	21
6	15	22
7	17	21
8	13	20
9	13	21
10	16	22
11	13	22
12	15	24
13	14	21
14	16	22
15	16	20
16	10	21

Sr. No.	Initial Score (Out of 25)	Final Score (Out of 25)
17	16	21
18	16	24
19	10	21
20	8	20
21	10	23
22	4	18
23	17	25
24	16	25
25	15	21
26	15	23
27	16	22
28	15	23
29	13	24
30	17	23
31	16	23
32	7	20
33	20	25
34	18	24
35	18	25
36	13	22
37	13	23
38	16	23
39	13	22
40	18	25
41	17	25
42	16	23
43	18	24

Sr. No.	Initial Score (Out of 25)	Final Score (Out of 25)
44	14	22
45	8	20
46	8	18
47	14	20
48	18	24
49	20	25
50	16	23
51	15	21
52	17	22
53	17	24
54	19	25
55	13	22
56	8	19
57	11	22
58	6	18
59	10	21
60	8	21
61	15	24
62	13	22
63	13	25
64	10	22
65	11	21
66	14	25
67	13	24
68	15	22
Mean Score	**13.54**	**22.13**

The initial score of the respondents about management, control and preventive measures of abortion varied from 4 to 20 with a mean score of 13.54 ± 0.451 (S.E.), while the final score after exposure to instructional device ranged from 18 to 25 with a mean score of 22.13 ± 0.234. Thus, the average increase in score amounted to 8.59 ± 0.311 which represents 63.44 % knowledge gain. The results are also represented graphically in Figure 6.

4.2.4 Overall knowledge gain about abortion in dairy animals:

The overall initial and final score of the respondents about all the aspects of abortion including general terminology, various causes, management, control and preventive measures before and after exposure to developed CD-ROM was recorded by respective sum of the individual scores obtained by the respondents in each section.

Table 7: Overall initial and final Score of the respondents about all aspects of abortion in dairy animals

Sr. No.	Initial Score (Out of 50)	Final Score (Out of 50)
1	24	42
2	24	44
3	10	37
4	10	36
5	21	40
6	28	44
7	27	42
8	21	39
9	22	44
10	28	45
11	28	46
12	30	47
13	21	39
14	29	46
15	31	43

Sr. No.	Initial Score (Out of 50)	Final Score (Out of 50)
16	18	40
17	26	41
18	29	49
19	16	42
20	18	42
21	20	46
22	8	38
23	33	48
24	31	47
25	32	45
26	33	48
27	33	43
28	31	46
29	24	45
30	35	48
31	26	45
32	20	44
33	32	48
34	30	46
35	32	46
36	26	46
37	18	43
38	30	44
39	24	45
40	28	47
41	34	50
42	31	47
43	37	49
44	24	44

Sr. No.	Initial Score (Out of 50)	Final Score (Out of 50)
45	13	41
46	18	37
47	27	42
48	38	49
49	38	49
50	27	42
51	27	42
52	33	45
53	36	48
54	37	48
55	24	44
56	17	37
57	21	40
58	11	35
59	22	40
60	15	42
61	27	44
62	27	46
63	25	45
64	21	45
65	20	42
66	27	49
67	28	47
68	29	46
Mean Score	**25.61**	**43.99**

The initial total score of the respondents about all aspects of abortion varied from 10 to 38 with a mean score of 25.61 ± 0.857 (S.E.), while the final score after exposure to instructional device ranged from 35 to 50 with a mean score of 43.99 ± 0.431. Thus, the average increase in score amounted to 18.38 ± 0.561 representing 71.77 % knowledge gain. The results are also represented graphically in Figure 7.

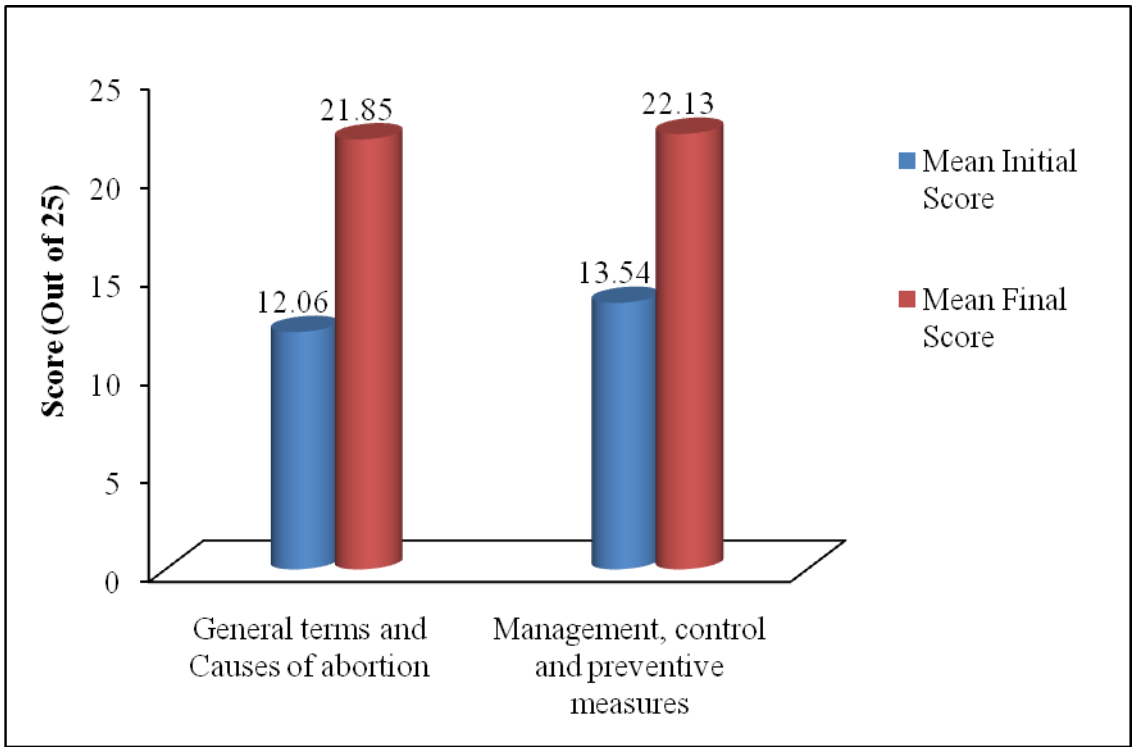

Figure 6: Section wise Mean Initial and Final Score of the Respondents

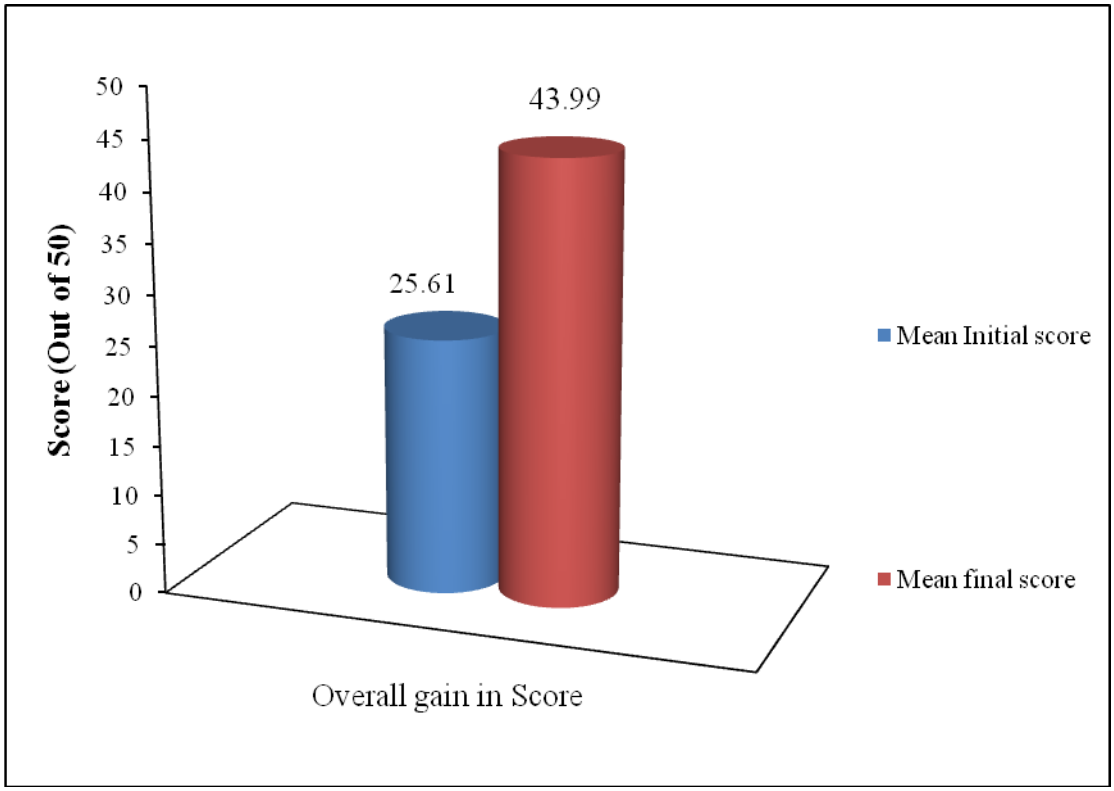

Figure 7: Overall Mean Initial and Final Score of the Respondents

Table 8: Performance of learners before and after exposure to CD-ROM

Score Range (out of 50)	Number of Respondents at Pre- Exposure Level	Number of Respondents at Post- Exposure Level
45-50 (Excellent)	0	34
35-45 (Very good)	6	33
25-35 (Good)	34	1
0-25 (Poor)	28	0

At pre exposure testing, about 41.2% of the respondents fared poorly scoring less than 25 marks. This fraction was reduced to nil after exposure to the developed video. Initially, 50% of respondents scored 25 to 35 marks while at final testing, only 1.5% of them scored in this range. About 8.8% of respondents fell into very good score category, scoring 35 to 45 marks while the same score was achieved by 48.5% of the study group after the developed video was shown to them. None of the respondents was able to score 45 or more marks at initial testing while 50% of them had such score at final testing done after being exposed to video in CD-ROM.

Table 9: Effectiveness of the CD-ROM for knowledge gain among the farmers:

Sr. No.	Knowledge Criterion	Initial Score (Mean ± S.E.)	Final score (Mean ± S.E.)	Mean Difference in Score (Mean ± S.E.)	Percent gain	't' Value
1.	General terminology and causes of abortion	12.06 ± 0.485	21.85 ± 0.260	9.80 ± 0.341*	81.18	28.68
2.	Management, control and prevention of Abortion	13.54 ± 0.451	22.13 ± 0.234	8.59 ± 0.311*	63.44	27.62
3.	Overall knowledge about abortion in dairy animals	25.61 ± 0.857	43.99 ± 0.431	18.38 ± 0.561*	71.77	32.74

*** = Significant at 1% level**

The differences in the mean scores, obtained by the respondents before and after the exposure to CD-ROM on abortion in dairy animals, were tested for their significance by applying paired‘t’ test using SPSS software in computer. The differences in the mean initial and final scores were found to be statistically highly significant (at 1% level) in all the three cases, rejecting null hypothesis of no difference in initial and final score. This means that significant difference in knowledge was found at pre and post exposure levels. Thus, it could be inferred hat CD-ROM had positive effect on the learning by the respondents and led to significant increase in their scores. These findings validate its use for creating awareness among dairy farmers about the problem of abortion in dairy animals.

Table 10: Correlation between various Socio-Personal characteristics and overall knowledge gain

The correlation coefficients between various socio-personal characteristics of the respondents and their knowledge gain were calculated as:

Characteristics	Correlation coefficient (‘r’)	Significance (At 5% Level)
Age	-0.034	Non Significant
Education	0.092	Non Significant
Occupation	-0.211	Non Significant
Family Type	0.102	Non Significant
Mass Media Exposure	0.080	Non Significant

The correlation analysis yielded that none of the socio-personal characteristics was significantly correlated to gain in knowledge by the respondents. This may be due to the reason that the gain in information was similar in all the sub groups. The effect of difference in socio personal characteristics was overcome by the video based teaching and CD-ROM was proved to be an effective tool of knowledge dissemination in all the groups.

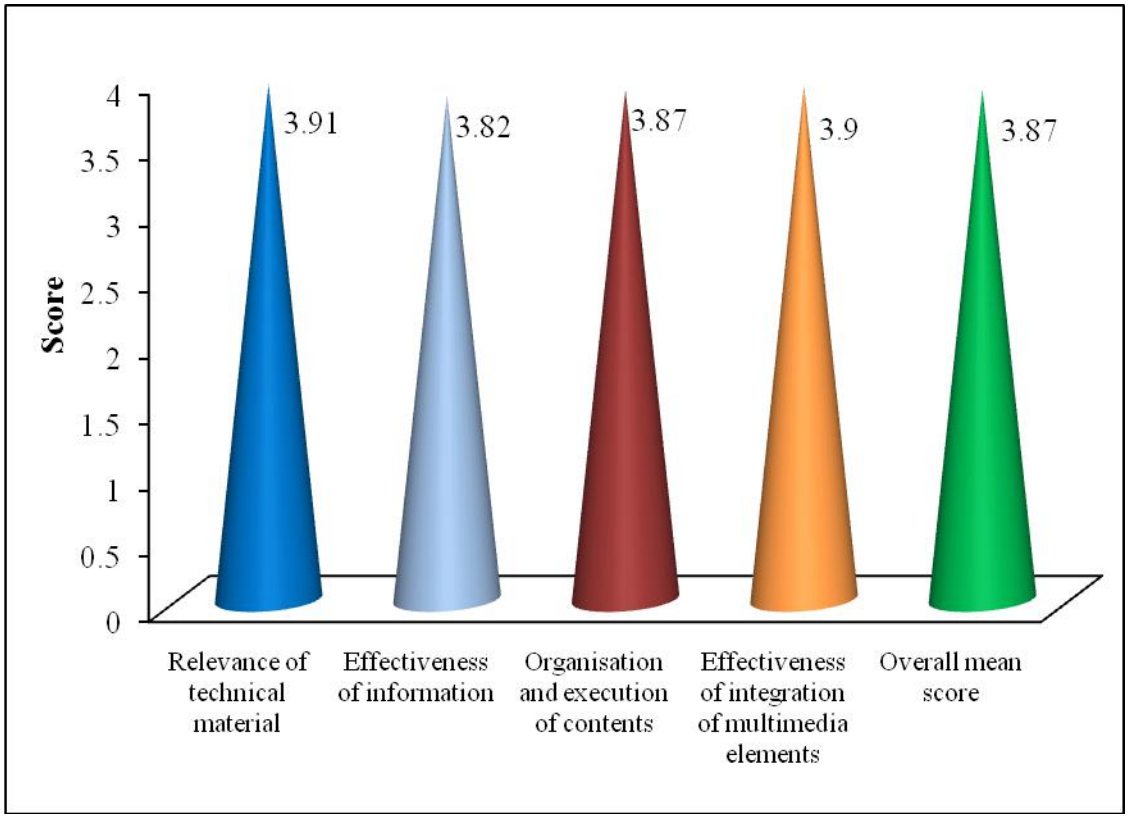

Figure 8:Measures of Attributes of CD-ROM

4.3 FINAL RATING OF CD-ROM

Table 11: Measures of attributes of CD-ROM on Abortion in Dairy Animals

Sr. No.	Attributes	Mean Score (out of 4)
1.	Relevance of technical material	3.91
2.	Effectiveness of information	3.82
3.	Organisation and execution of contents	3.87
4.	Effectiveness of integration of multimedia elements	3.90
	Overall Mean Score	**3.87**

The mean score value of different attributes of CD-ROM (Table 11) formed the basis for the final rating of the developed CD-ROM. The mean scores of different attributes i.e. relevance of technical material, effectiveness of information, organisation and execution of contents and effectiveness of integration of multimedia elements were 3.91, 3.82, 3.87 and 3.90 respectively (Figure 8). The overall mean score of all the attributes of CD-ROM was 3.87, which justifies its use as an instructional device for delivering all the information related to abortion in dairy animals to the targeted end users.

DISCUSSION

Many studies have been conducted to evaluate the effectiveness of the video based communication for creating awareness and knowledge gain about various aspects of livestock rearing. But, this study appears to be first one on the topic of abortion in dairy animals. The learning and adoption process of the farmers is complex and affected by number of factors. The developed communication medium (CD-ROM) is of immense potential value for dairy farmers. The all time availability of such learning module with the farmer induces its repeated use and complements the learning process of the farmers. Eventually, the developed communication medium (CD-ROM) can take up leading role in the adoption of best management practices by the farmers along with positive favour from all the other factors.

The results of my study were found similar to Jain (2005) who developed and standardized media package on animal husbandry practices and reported significant

gain in knowledge and change in attitude of rural women after exposure to video cassette/CD. Statistically significant gain in knowledge about abortion in dairy animals was found among the respondents of my study.

Vidya *et al* (2010) revealed that interactive video-DVD was an appropriate tool to disseminate knowledge on dairy health management practices and all the respondents were convinced about the use of scientific management practices on exposure to the health care management practices through video DVD. Likewise, Mallinga *et al* (2012) determined the effectiveness of CD lesson on the knowledge of milk vendors about clean milk production. They reported that the knowledge gain was 51.43 per cent in management, 32.33 per cent in animal shed maintenance and 32.08 per cent in milk storage and transport system. The CD lesson was found to be effective in disseminating knowledge about clean milk production practices among milk vendors. In my study, there was 71.77 % gain in knowledge about overall aspects of abortion in dairy animals, which highlights the worth of video based communication.

The results were also in line with Sasikala *et al* (2012) who measured effectiveness of multimedia compact disc (MCD) on dissemination of knowledge among the pig farmers in and found out significant difference with respect to mean knowledge scores of farmers at pre and post-exposure stages. Also, Singh (2012) designed a multimedia application (CD-ROM) on Dairy Enterprise and tested its effectiveness and validation. The results showed that CD- ROM is one of the best learning and instructional device for new/budding farmers in modern context as the new generation learns easily from modern gadgets and can lead to systematic and sustainable growth of dairy sector. The pre and post exposure testing of the respondents indicated that there was sufficient impact of learning (change in knowledge) as well as learning of new things to them.

My study proved the worth of CD-ROM as an effective tool in the delivery of scientific information about all aspects of abortion in dairy animals to the dairy farmers. The developed CD-ROM was validated and rated highly satisfactory by the subject matter specialists. There was statistically significant increase in the knowledge level of the respondents after exposure to the CD-ROM on abortion in dairy animals.

CHAPTER V

SUMMARY AND CONCLUSIONS

The dairy farming sector faces certain problems which reduce its profitability and viability. Among various problems occurring at a dairy farm, which hamper the reproduction and productivity, abortion is an important problem attributing to its multidimensional negative effects on the economics of dairy farmer. So, every effort should be done to bring the incidence of abortion at a dairy farm to the negligible level. This warrants higher level of farmers' awareness about various causes, control and prevention measures against abortion in dairy animals.

The basic aim of the Veterinary Extension is to bridge the gap between the scientists/researchers from various subfields and the end users (livestock farmers). Various types of strategies and teaching methods are used by field level extension workers to make the livestock farmers interested in newer techniques and persuade them for their adoption. The audio visual aids maximise the learning and adoption rate among the farmers, owing to engagement of multiple senses. Video based communication mediums also lead to effective delivery of the required message without minimal distortion. Video based teaching also eliminates the literacy barrier and it can be adjusted to local language or dialect.

So the present study entitled "Designing a CD–ROM for awareness about abortion in dairy animals" was undertaken to achieve the following objectives:

5.1 OBJECTIVES OF THE STUDY

i) To develop relevant text and graphic illustrations regarding abortion in dairy animals.

ii) To design multimedia application (CD-ROM) on abortion in dairy animals.

iii) To test its effectiveness and validation.

5.2 RESEARCH METHODOLOGY

5.2.1 Designing of CD-ROM

Various steps for designing of CD-ROM were as:

5.2.1.1 Selection of topic

Optimum levels of reproductive parameters form the basis for the sustainability and profitability in the occupation of dairy farming. Abortion is one of the limiting factors

preying upon the profit of dairy farmers. The enhanced awareness of the dairy farmers regarding control and prevention measures can help to curtail the losses caused by the abortion in dairy animals. Video based instructional devices hold a great promise in targeted delivery of correct management practices to the end users. Since, the majority of households in Punjab own Television sets and video operating devices, so a CD-ROM on abortion in dairy animals has been designed and developed to create awareness among the farmers.

5.2.1.2 Development of manuscript

Development of the manuscript was done with help from literature sources including books, magazines, journals and internet etc. The contents were validated with help of experts.

5.2.1.3 Delivery mode of the manuscript/content

The whole information in the manuscript was synthesised into a logical sequence so as to capture the attention of the viewers. Important points and instructions were given due emphasis.

5.2.1.4 Script for multimedia application

The script was developed to prepare an outline for the multimedia elements application.

5.2.1.5 Multimedia elements

The multimedia elements i.e. text, graphics, audio, videos etc were developed as per need from various field cases, dairy complexes and computer software application. The audio was recorded in Punjabi dialect so as to make it more comprehensible to the dairy farmers of Punjab state.

5.2.1.6 Designing of screen

The screen designing was done with background colours and added effects to make it look more appealing.

5.2.1.7 Development of raw type CD-ROM

Raw CD-ROM for awareness about abortion in dairy animals was developedby computer aided integration of all the multimedia inputs.

5.2.2 Testing and validation of CD-ROM

5.2.2.1 Testing of CD-ROM

A questionnaire containing 50 questions, each of one mark, on abortion in dairy animals was presented to 68 respondents. The questions were grouped into two parts. First half contained questions related to general terminology and causes and the other half related to management, control and prevention measures against abortion in dairy animals. The pre and post exposure scores of the respondents were recorded.

5.2.2.2 Statistical analysis of data

Student's't' test (for paired observations) was applied to test the significance of the difference in the score of the respondents and to statistically validate the results.

5.2.2.3 Validation of CD-ROM

Multimedia elements used in the development of CD-ROM were evaluated by subject matter specialists, using a marking scale. An overall final rating score based on the four attributes was also given to the prepared CD-ROM.

5.2.2.4 Modification for final CD-ROM

The advised corrections and suggestions were incorporated accordingly and final CD-ROM was developed.

CONCLUSIONS

i. An overall mean score of **3.74** out of **4** (93.5%) was attributed to multimedia elements of developed CD-ROM, indicating the worthiness of the video based instructional device.

ii. There was **81.18 %** knowledge gain among the respondents, about general terminology and causes of abortion in dairy animals, after exposure to developed CD-ROM.

iii. The viewing of video led to average increase of **63.44 %** in knowledge score of respondents about management, control and prevention measures of abortion.

iv. Overall, there was **71.77 %** knowledge gain among the respondents about different aspects of abortion in dairy animals.

v. The differences in scores before and after the exposure to developed CD-ROM were found to be statistically significant at 1% level of significance.

vi. There was no significant correlation between selected socio-personal characteristics and knowledge gain among the respondents.

vii. The final rating score of developed CD-ROM was marked to be **3.87** out of **4** by the subject matter experts.

The results of the evaluation clearly prove the worth of CD-ROM as an instructional device for disseminating the relevant technical information in an easy and comprehensible manner to the target users. The developed CD-ROM on abortion in dairy animals had highly significant positive effect on the knowledge gain of the respondents in the study group. It will help the farmers to bring down the incidence of abortion at their dairy farms. This will lead to significant increase in milk production as well as profit of the dairy farmers and on the other hand there is good scope for bringing awareness about zoonotic disease and clean milk production.

REFERENCES

Anuradha and Singh A R.2012. Effectiveness of the Developed Video Compact Disc (VCD) in Knowledge Dissemination**.** *Indian Journal of Extension Education* **48 (**1 & 2): 81-83.

Asrani S, Kaushik S, Yadav K K and Asrani R K. 2011. Development and testing of documentary film on poultry farming. *Indian Journal of Poultry Science* **46**(3): 385-89.

Atwal K S, Prabhakar S and Ghuman S P S. 2002. Prevalence of various reproductive disorders in buffaloes in seleniferous areas of Punjab. *Indian Journal of Animal Reproduction* **23**:187-88.

Block G, Miller M, Harnack K, Kayman S and Cristofars. 2000. An interactive CD - ROM for nutrition screening and counselling. *American Journal of Public Health* **90** (5):781-85.

Chand S. 2011. Analysis of reproductive disorders in dairy animals in Alwar district of Rajasthan. M.Sc.Thesis, NDRI (Deemed University), Karnal.

Dascanio J J, Shires P K, Croft R S, Thatcher C D and Lewis L D. 1997. Multimedia Case-Simulation Computer Programme for Teaching Veterinary Nutrition. *Journal of American Veterinary Medical Association* **211**(11)**:** 1380-84.

Dhindsa S S, Nanda R and Kumar B. 2014. Problems and constraints of dairy farming in Fatehgarh Sahib District of Punjab. *Progressive Research* **9** (1): 250-52.

Dua K. 2003. Comparative Disease susceptibility of Cattle and Buffalo in Punjab (India). Proceedings of the 10th International Symposium on Veterinary Epidemiology and Economics, Punjab Agricultural University, Ludhiana.

Garforth C. 2003. Management of knowledge and Information for Improved Animal Health -DFID Workshop on Cattle Health Issues in the Peri-Urban Regions: Potentials of Information in Coping with Poverty held on 20 – 21st March at RAGACOVAS Pondicherry: 34-42.

Gill T K and Saini S K. 2008. A study of awareness of recommended dairy practices among farmers. *International journal of Agricultural Sciences* **4** (1): 296-300.

Hai A, Srivastava R M and Singh R P. 2003. Livestock Farmer's Preference of communication Media and their use by Extension workers in tribal Bihar. *Indian Journal of Extension Education* **39** (1 & 2): 31-34.

Jain V. 2005. Development and standardization of media package on animal husbandry practices for rural women of Haryana. Ph.D thesis, Chaudhary Charan Singh, Haryana Agricultural University, Hisar.

Kadian K S and Gupta S. 2006. Effectiveness of a Video Compact Disc (VCD) on Dairy Calf Management Practices. *Indian Journal of Extension Sciences* **1**(1): 57-62.

Kaikini A S, Kadu M S, Bhandari R M and Belorker P N. 1976. Studies on the incidence of normal and pathological termination of pregnancies in dairy animals. *Indian Journal of Animal Science* **46**: 14-22.

Kala S, Singal S and Singh R K P. 2001. Economic viability of tribal women headed dairy enterprise: A case study. *Bihar Journal of Agriculture and Marketing* **9**(2): 190-97.

Kaur A. 2004. Study on adoption of selected recommended management and disease prevention practices by members of Progressive Dairy Farmers Association. M.V.Sc. Thesis, Punjab Agricultural University, Ludhiana, Punjab.

Khan H M. 2008. Prepartum and postpartum managemental interventions for improving reproductive performances in Murrah Buffaloes. Ph.D Thesis, NDRI (Deemed University), Karnal.

Kilpatrick S. 2000. Education and training: Impact on farm management practice. *Journal of Agriculture Extension Education* **7**(2): 105-116.

Kirubaharan J J, Gopalam A and Padmanabhan V D. 2000. VIRUS – A computer aid Instruction Package for Virology. *Indian Veterinary Journal* **77** (6): 537-38.

Mallinga J, Narmatha N, Uma V, Akila N, and Sakthivel K M. 2012. Effectiveness of CD lesson on the knowledge level of milk vendors in clean milk production practices. *J. Dairying, Foods & Home Science* **31** (1): 52-54.

Meena M S. 2000. An assessment of constraints experienced by the farmers regarding reproductive problems in dairy animals in Karnal district. Ph.D Thesis, NDRI (Deemed University), Karnal.

Meena B S, Kumar R and Singh A. 2014. Effectiveness of multimedia digital video disk on knowledge gain of improved dairy farming practices. *Indian Journal of Dairy Science* **67**(5): 441-45.

Mehrotra S and Dey A. 1998. Incidence of abortion in exotic and crossbred dairy cattle in temperate regions of Himalayas. *Indian Veterinary Journal* **75**: 359-61.

Murugeppa A and Dubey B M. 1998. Reproductive wastages and disorders in Surti buffaloes during pregnancy and parturition in different parity. *Indian Veterinary Journal* **75**:84-85.

Nath M, Elangovan A U, Mandal A B and Johri T S. 2003. "Make Feed" computer software for formulation of poultry rations. *Indian Farming* **53:** 24-27.

National Dairy Development Board. www.nddb.org. Accessed on 01-02-2015.

Pandian S, Rathakrishnan T and Sivakumar P S. 2002. Video education a tool for knowledge gain. *Agriculture Extension Review* **14**: 3.

Patil A P, Gawande S H, Nande M P and Gobade M R. 2009. Assessment of knowledge level of dairy farmers in Nagpur district and the correlation between socio- economic variables with their training needs. *Veterinary world* **2** (5): 100-201.

Rabbani R A, Ahmad I, Lodi L A, Ahmad N and Muhammad G. 2010. Prevalence of various reproductive disorders and economic losses caused by genital prolapses in buffaloes. *Pakistan Veterinary Journal* **30** (1): 44-46.

Sah U, Kumar S and Fulzele R M. 2002. Perceived needs of dairy farmers and farm women related to improved dairy farming in India – An Overview. *Agriculture Review* **23**(1): 65-70.

Saha D, Akand A H and Hai A. 2010. Livestock Farmers knowledge about rearing practices in Ganderbal district of Jammu & Kashmir. *Indian Journal of Extension Education* **10** (2): 15-19.

Sasikala V, Kumaravel P, Mathialagan P and Saravanan M. 2012. Effectiveness of multimedia compact disc (MCD) on dissemination of knowledge among the pig farmers. *Tamilnadu J. Veterinary & Animal Sciences* **8** (6): 381 – 388.

Sharma G and Kumar B. 2000. Integrating video in Farmer's Training Instructional Systems Design Perspective. *Indian Journal of Training and Development* **30**: 40-46.

Siddiquee G M, Shukla M K and Kanwar N. 2007. Incidence of reproductive disorders in bovines of North Gujarat. *Journal of Bombay Veterinary College* **15 (**1/2): 119-121.

Singh G. 1991. Studies on incidence of various reproductive disorders in bovines with special reference to mycotic infections in repeat breeding animals. M.V.Sc. thesis, Punjab Agricultural University Ludhiana, India.

Singh O. 2001. Perception and knowledge of farmers and veterinary officers towards infertility in dairy animals. M.Sc. Thesis, NDRI (Deemed University), Karnal.

Singh R. 2004. Estimations of economic losses due to diseases in dairy animals in Amritsar district. *Agricultural Economics Research Review* **17** (1): 139.

Singh S. 2012. Designing a CD-ROM for a Dairy Enterprise. M.V.Sc. Thesis, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana.

Singh L and Thomas C K. 1992. Knowledge and adoption in the technology of dairy farming and its constraints. *Indian Dairyman* **44** (9): 445-50.

Sireesha P, Rao B S and Raju D T. 2014. Extent of use of information and communication technology (ICT) tools by various animal husbandry organizations (A.H.) in Andhra Pradesh. *International Journal of Innovative Research in Science, Engineering and Technology* **3** (5): 1276-95.

Sloan P A, La Fountain P, Plymale M and Sloan D A. 2002. Cancer pain education for medical students: The development of a short course on CD-ROM. *Pain Medicine* **3**(1): 66-72.

Sweeny M A and Chiriboga D A. 2003. Evaluating the effectiveness of a multimedia programme on home safety. *Gerontologist* **43** (3): 325-34.

Thusoo R K, Khattra P S, Khar S and Trakroo C L. 2007. Comparative profitability of crop and dairy enterprise in semi hilly tracks of district Gurdaspur and Jammu. *Journal of Research Punjab Agriculture University* **44** (2): 154-59.

Verma H K, Sharma M K and Kasrija R. 2015. Infectious abortions in dairy animals. Compendium of lectures of training programme on control of infectious animal diseases held at Department of Veterinary Medicine, College of Veterinary Science, Guru Angad Dev Veterinary and Animal Sciences University Ludhiana from 27th to 31st January, 2015: 60-67.

Vidya P, Manivannan C, and Kumar N K S. 2010. Effectiveness of an Educational Interactive Video-DVD on Dairy Health Management Practices in Terms of Knowledge Gain among Dairy Farmers. *Online Journal of Rural Research & Policy* **5** (7): 1-17.

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