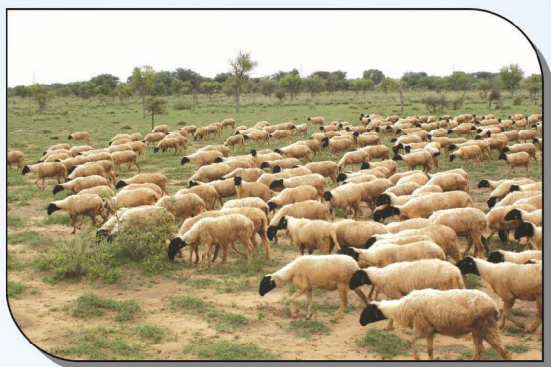




## भेड़ सुधार नेटवर्क परियोजना NETWORK PROJECT ON SHEEP IMPROVEMENT



परियोजना समन्वयक की वार्षिक प्रतिवेदन  
PROJECT CO-ORDINATOR'S ANNUAL REPORT  
(01.04.2013 to 31.03.2014)



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भारतीय कृषि अनुसंधान परिषद

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Compiled by

Dr. S. M. K. Naqvi, Director, CSWRI & Project Coordinator  
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Dr. S. S. Misra, Sr. Scientist



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**October, 2014**

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## **PREFACE**

The annual report of the Network Project on Sheep Improvement (NWPSI) for the period 01-04-2013 to 31-03-2014 has been compiled from progress reports obtained from six units under NWPSI. The funds allocated by the council as revised budget estimate for the year 2013-14 are presented.

I thank P.I's / Scientist Incharges of all the units for their valuable contributions. The sincere efforts made by all the associated scientists and staff of NWPSI centres deserve a word of appreciation and I am highly thankful to every one of them.

Dr. Arun Kumar, Head of the Division and staff of Division of Animal Genetics and Breeding deserve deep appreciation for their help. Special thanks are due to Mr.N.C.Gupta, T-5, AGB Division for his assistance in file maintenance.

My sincere thanks are due to the Dr. S.M.K. Naqvi, Director, CSWRI and Project Coordinator (Sheep Breeding) for his guidance, overall monitoring and providing facilities for the Project Coordinator's Cell.

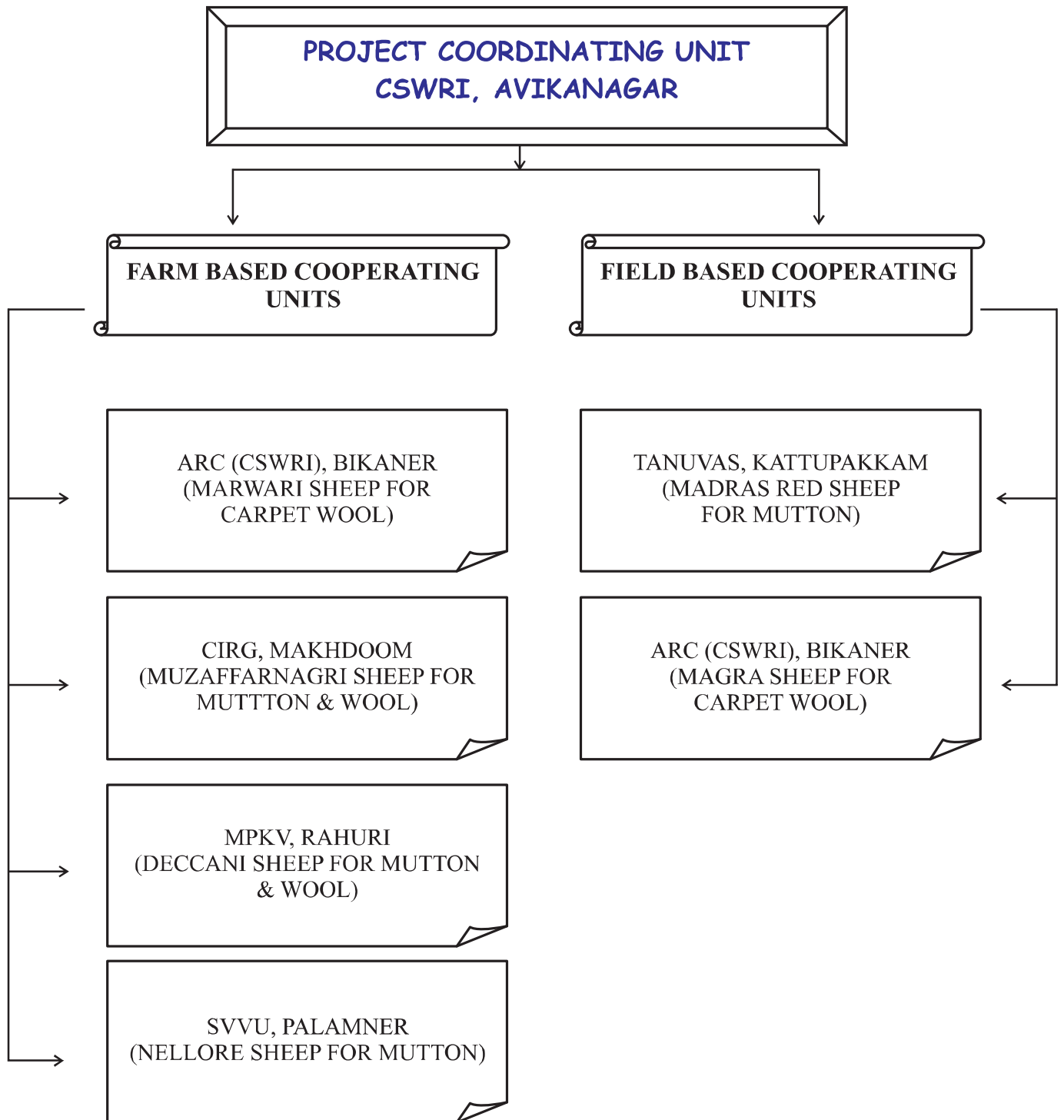
I take this opportunity to express my sincere gratitude to Dr. K.M.L. Pathak, Deputy Director General (Animal Science), Dr. R.S.Gandhi, Assistant Director General (AP&B) and Dr Vineet Bhasin, Principal Scientist (AG&B), Animal Science Division, Indian Council of Agricultural Research, for their keen interest and critical guidance in the project activities.

**(L. Leslie Leo Prince)**  
Incharge, PC Cell

Avikanagar  
October, 2014



## NETWORK PROJECT ON SHEEP IMPROVEMENT



## NETWORK PROJECT ON SHEEP IMPROVEMENT: PROJECT TEAM

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**Marwari ram**



**Marwari flock**



**Muzaffarnagri ram**



**Muzaffarnagri ewe**



**Deccani ram**



**Deccani - Field data recording**



**Nellore ram**



**Nellore flock**





**Madras Red ram**



**Madras Red adopted flock**



**Magra ram**



**Magra flock**



**DDG (AS) & Director at Magra Unit**



**Magra Unit - ram distribution**



**Training on AI**



**Training on AI**

## CONTENTS

<b>Sr. No</b>	<b>Title</b>	<b>Page No</b>
A	SUMMARY	1-2
B	सारांश	3-4
1	NETWORK PROJECT ON SHEEP IMPROVEMENT	5-7
1.1	Introduction	5
1.2	Objectives	5
1.3	Technical Programme	5-6
1.4	Targets	7
2	UNIT WISE PERFORMANCE OF NWPSI CENTRES	8-23
2.1	ARC (CSWRI), Bikaner (Rajasthan) : Marwari sheep for carpet wool	8-10
2.2	CIRG, Makhdoom (Uttar Pradesh) : Muzaffarnagari sheep for mutton and wool	11-13
2.3	MPKV, Rahuri (Maharashtra) : Deccani sheep for mutton and wool	14-16
2.4	S.V. V. University, LRS Palamner (AP) : Nellore sheep for mutton	17-18
2.5	TANUVAS, Kattupakkam (Tamil Nadu) : Madras Red sheep for mutton	19-21
2.6	ARC (CSWRI), Bikaner (Rajasthan) : Magra sheep for carpet wool	22-23
3	INFRASTRUCTURAL SETUP OF NWPSI UNITS	24-25
3.1.1	P C Cell, CSWRI, Avikanagar	24
3.1.2	Staffing pattern at SAU units	24
3.1.3	Staffing pattern at ICAR units	24
3.2	Meeting and training organized	25
3.3	Centre wise budget allocation (2013-14)	25
4	PUBLICATIONS	26-28
5	ACTION TAKEN REPORT	29-31
6	OBSERVATIONS OF PROJECT COORDINATOR	32



## SUMMARY

Network Project on Sheep Improvement (NWPSI) was initiated on 1.4.1990 for survey, evaluation and improvement of indigenous sheep breeds under native environment. All the centres of All India Coordinated Research Project on Sheep Breeding (AICRP SB) were converted into NWPSI Centres. Different breeds of sheep are being improved through selection and inter-se mating for wool and mutton production. The mandate of NWPSI is survey of indigenous sheep, their genetic evaluation and improvement. During 2013-14, there are six centres of NWPSI including farm based units at ARC (CSWRI), Bikaner (Marwari, carpet wool), CIRG, Makhdoom (Muzaffarnagari, Dual type), MPKV, Rahuri (Deccani, Dual type) and SVVU, Palamner (Nellore, Mutton) and field based units at TANUVAS, Kattupakkam (Madras Red, Mutton) and ARC (CSWRI), Bikaner (Magra, Carpet wool).

The technical programme aims at improvement of indigenous sheep breeds under farm conditions wherein the male lambs are first ranked using selection index. Best lambs are selected and mated at the age of 18 months. Subsequently these rams are again evaluated based on their progeny performance and best 2-3 rams are selected and used for breeding. Each field-based unit has four centres including a ram-rearing centre, covering a sheep population of about 1500 breedable ewes per centre. The superior male lambs are selected from the farmers' flocks on the basis of first six monthly greasy fleece yield and six month body weight in Magra sheep and on six month body weight basis in Madras Red sheep. Unit wise results of the Network Project on Sheep Improvement are summarized below:

**Marwari Unit, Arid Region Campus (CSWRI), Bikaner:** The average birth, 3, 6, 9 and 12- month weights of 2013 born lambs were 3.03, 16.60, 25.81, 30.15 and 33.05 kg, respectively. The overall tuppings and lambing on ewes available basis were 93.20% and 85.86% respectively. The average diameter and medullation were 33.54 $\mu$  and about 47.15%. Adult annual GFY was 1582 gms. The overall survivability was 97.08%. A total of 22 Marwari ram/ram lambs were sold to various agencies for sheep improvement programme.

**Muzaffarnagari Unit, CIRG, Makhdoom:** Least square means for birth, 3, 6, 9 and 12- month weights of 2013 born lambs were 3.78, 18.18, 26.34, 30.78 and 35.49 kg, respectively. Tuppings were 93.4%. Lambing based on ewes available and tuppings was 76.9% and 83.2%, respectively. The overall survivability was 96.36%. A total of 51 rams were sold to various agencies for sheep improvement programme.

**Deccani Unit, MPKV, Rahuri:** Average body weights at birth, 3, 6, 9 and 12- month weights of 2013 born lambs were 3.45, 16.05, 22.66, 23.52 and 25.96 kg, respectively. The tuppings percentage was 93.84 while the lambing based on ewes available was 90.44%. The overall survivability was 94.88%. Unit sold 4 breeding rams and distributed 42 ram to the farmers/ various agencies for sheep improvement programme.

**Nellore Unit, SVVU, LRS Palamner :** The overall means for body weight at birth, 3, 6, 9 and 12- month weights of 2012-13 born lambs were 3.15, 14.37, 22.10, 26.85 and 29.10 kg, respectively. The tuppings percentage was 96.35 while the lambing based on ewes available was 85.1%. During the year under report in about 104 rams were sold to different farmers for breed improvement programme



**Madras Red Unit, T.A.N.U.V.A.S., LRS Kattupakkam :** Overall mean body weights for lambs born during 2013 for birth, 3, 6, 9 and 12-month weights were 2.58, 11.62, 15.57, 19.47 and 21.13 kg, respectively. 85.62 per cent lambing was observed during the year. A total of 63 ram were distributed to registered farmers at various centres.

**Magra Unit, Arid Region Campus (CSWRI), Bikaner:** Survey of Magra sheep was conducted in the breeding tract for identification and selection of centres in the field as well as flocks and for collection of baseline data. Three centres were identified viz. Kotra, Kanasar and Jaalwali. The average body weights at birth, 6 and 12 months were 3.06, 19.05 and 27.25 kg, respectively. A total of 23 rams were distributed to registered farmers at various centres.

Annual Review Meeting to review the performance made during 2012-13 was held at Jaipur on 16-17th, November, 2013 under the chairmanship of Dr. K.M.L.Pathak, DDG (Animal Science). Dr. R.S.Gandhi, ADG (AP&B), Dr. Vineet Bhasin, Principal Scientist, ICAR, PIs/Co-PIs from six sheep units and scientists from CSWRI participated in the meeting. Progress made by the six units was reviewed and suitable suggestions and recommendations were provided for further improvement in the programme.

Training program on “Demonstration of Estrus Synchronization and Artificial Insemination (AI) in Sheep” for scientists/ Professors/ PIs of field based units of Network Project on Sheep Improvement was conducted during 1-7th August, 2013 at CSWRI, Avikanagar. Staff of the farm based units of Network Project on Sheep Improvement participated in Training program on “Demonstration of Estrus Synchronization and Artificial Insemination (AI) in Sheep” conducted during 11-17th February, 2014 at CSWRI, Avikanagar.

## सारांश

देशी वातावरण के अन्तर्गत स्थानीय भेड़ों की नस्लों का सर्वेक्षण, मूल्यांकन एवं सुधार हेतु दिनांक 01.04.1990 को भेड़ सुधार पर नेटवर्क परियोजना (NWPSI) प्रारम्भ की गई। भेड़ प्रजनन पर अखिल भारतीय समन्वय परियोजनाओं (AICRP-SB) के सभी केन्द्र NWPSI केन्द्रों में परिवर्तित किए गए। ऊन एवं मांस उत्पादन के लिए विभिन्न भेड़ों की नस्लों में चयन एवं अन्तः समागम से सुधार किया जा रहा है। NWPSI का अधिदेश्य स्थानीय भेड़ों का सर्वेक्षण, उनका आनुवंशिक मूल्यांकन एवं सुधार करना है। वर्ष 2013-14 के दौरान NWPSI के छः केन्द्र जिनमें ए.आर.सी. (सी.एस.डब्ल्यू.आर.आई), बीकानेर (मारवाड़ी, गलीचा ऊन), सी.आई. आर.जी., मखदूम (मुजफ्फरनगरी, द्विउददे शीय), एम.पी.के.वी., राहुरी (डक्कनी, द्विउददे शीय) एवं एस.वी. वी.यू., पालमनेर (नेल्लोर, मांस) वाली फार्म आधारित इकाईयाँ एवं ए.आर.सी. (सी.एस.डब्ल्यू.आर.आई), बीकानेर (मगरा, गलीचा ऊन) एवं टी.ए.एन. यू.वी.ए.एस, कट्टूपक्कम (मद्रास रेड़, मांस) प्रक्षेत्र आधारित इकाईयाँ शामिल हैं।

तकनीकी कार्यक्रम का मुख्य उद्देश्य फार्म परिस्थितियों के अन्तर्गत स्थानीय भेड़ों में सुधार करना है जिसमें नर मेमनों को चयन सूचकांक के प्रयोग से प्रथम स्थान पर रखा जाता है। सूचकांक में छः माह की आयु पर भारीरिक्त भार एवं ऊन उत्पादन को शामिल करना है। अठारह माह की आयु पर उत्कृष्ट मेमनों का चयन कर परीक्षक भेड़ों से संभोग कराया जाता है। तत्पश्चात् इन भेड़ों की संतति क्षमता आधारित पुनः आँकलन किया जाता है तथा उत्कृष्ट 2-3 भेड़ों का चयन कर इम्पूवर रेवड़ में प्रजनन हेतु प्रयोग किया जाता है। प्रत्येक प्रक्षेत्र आधारित इकाई में चार केन्द्र हैं जिसमें से एक केन्द्र मेढ़ा पालन केन्द्र होता है एवं लगभग 1500 प्रजनन योग्य भेड़ प्रति केन्द्र द्वारा कवर होते हैं। मद्रास रेड़ भेड़ों के छः माह के भारीरिक्त भार एवं मगरा भेड़ में प्रथम चिकनाईयुक्त ऊन उत्पादन एवं छः माह के भारीरिक्त भार के आधार पर किसानों के रेवड़ों से उत्कृष्ट नर मेमनों का चयन किया जाता है। प्रारंभ में 3 माह की आयु पर नर मेमनों को चिन्हित किया जाता है तथा प्रथम कल्पन के पश्चात् अंतिम रूप से चयन किया गया। इम्पूवर रेवड़ों से चयनित नर मेमनों को मूल रेवड़ों को प्रजनन हेतु आपूर्ति की जाती है। भेड़ सुधार पर नेटवर्क परियोजना के इकाई वार परिणाम संक्षेप में नीचे प्रस्तुत किए जा रहे हैं:

**मारवाड़ी इकाई, मरु क्षेत्रीय परिसर (सी.एस.डब्ल्यू.आर.आई.), बीकानेर:** जन्म, 3, 6, 9 एवं 12 माह की आयु पर भारीरिक्त भार क्रम 1: 3.03, 16.60, 25.81, 30.15 एवं 33.05 किग्रा. रहा। भेड़ों की उपलब्धता के आधार पर समागम एवं जनन दर क्रम 1: 93.20 एवं 85.86 रही। औसत व्यास एवं मेड़ूले तान 33.54 माइक्रॉन एवं लगभग 47.15 प्रति तान थी। वयस्क वार्षिक चिकनाईयुक्त ऊन उत्पादन 1582 ग्रा. था। कुल उत्तरजीवितता 97.08 प्रति तान थी। कुल 22 मारवाड़ी मेढ़े / नर मेमने भेड़ सुधार कार्यक्रम हेतु विभिन्न ऐजेन्सियों को बेचे गए।

**मुजफ्फरनगरी इकाई, सी.आई.आर.जी., मखदूम:** वर्ष 2013 में जन्में मेमनों का जन्म, 3, 6, 9 एवं 12 माह की आयु पर न्यूनतम वर्ग औसत भारीरिक्त भार क्रम 1: 3.78, 18.18, 26.34, 30.78 एवं 35.49 किग्रा. पाया गया। समागम 93.4 प्रति तान था। उपलब्ध भेड़ों के आधार पर समागम एवं जनन प्रति तान क्रम 1: 76.9 एवं 83.2 रहा। कुल उत्तरजीवितता 96.36 प्रति तान थी। कुल 51 मेढ़े भेड़ सुधार कार्यक्रम हेतु विभिन्न ऐजेन्सियों को बेचे गए।

**डक्कनी इकाई, एम.पी.के.वी., राहुरी:** जन्म, 3, 6, 9 एवं 12 माह की आयु पर औसत भारीरिक्त भार क्रम 1: 3.45, 16.05, 22.66, 23.52 एवं 25.96 किग्रा. रहा। समागम 93.84 प्रति तान था जबकि उपलब्ध भेड़ों के आधार पर जनन 90.44 प्रति तान था। कुल उत्तरजीवितता 94.88 प्रति तान थी। इकाई द्वारा भेड़ सुधार कार्यक्रम हेतु 4 प्रजनक मेढ़े बेचे गए तथा 42 मेढ़े किसानों / विभिन्न ऐजेन्सियों को वितरित किए गए।

**नेल्लोर इकाई, एस.वी.वी. यू., एल.आर.एस. पालमनेर:** जन्म, 3, 6, 9 एवं 12 माह की आयु पर औसत भारीरिक भार क्रम T: 3.15, 14.37, 22.10, 26.85 एवं 29.10 किग्रा. रहा। समागम 96.35 प्रति ता था जबकि उपलब्ध भेड़ों के आधार पर जनन 85.1 प्रति ता था। आलोच्य वर्ष के दौरान कुल 104 मेढ़े भेड़ सुधार कार्यक्रम हेतु विभिन्न ऐजेन्सियों को बेचे गए।

**मद्रास रेड़ इकाई, टी.ए.एन.यू.वी.ए.एस, एल.आर.एस. कटुपक्कम:** वर्ष 2013 के दौरान जन्में मेमनों का जन्म, दूध छुड़ाने पर, 6, 9 एवं 12 माह की आयु पर औसत कुल भारीरिक भार क्रम T: 2.58, 11.62, 15.57, 19.47 एवं 21.13 किग्रा. रहा। वर्ष के दौरान जनन 85.62 प्रति ता जनन देखी गई। विभिन्न केन्द्रों के पंजीकृत किसानों को कुल 63 मेढ़े बेचे गए।

**मगरा इकाई, मरु क्षेत्रीय परिसर (सी.एस.डब्लू.आर.आई), बीकानेर:** प्रक्षेत्र एवं रेवड़ों के केन्द्रों को चिन्हित एवं चयन करने तथा आधार रेखा के आँकड़े एकत्रित करने के लिए मगरा भेड़ के प्रजनन क्षेत्र में सर्वेक्षण किया गया। तीन केन्द्रों जिनमें कोत्रा, कानासर एवं जालवाली को चिन्हित किया गया। जन्म, 6 एवं 12 माह एवं वयस्क स्तर पर औसत भारीरिक भार क्रम T: 3.06, 19.05 एवं 27.25 किग्रा था। विभिन्न केन्द्रों के पंजीकृत किसानों को कुल 16 मेढ़े वितरित किए गए।

वर्ष 2012–13 के दौरान किए गए कार्यों की समीक्षा हेतु डॉ. के.एम. एल. पाठक, उपमहानिदेशक (पशु विज्ञान) की अध्यक्षता में दिनांक 16–17 नवम्बर, 2013 को जयपुर में वार्षिक समीक्षा बैठक का आयोजन किया गया। डॉ. आर.एस. गाँधी, सहायक महानिदेशक (ए.पी.एण्ड बी), डॉ. विनीत भसीन, प्राचार्य वैज्ञानिक, भा.कृ.अ. परिषद, छ: भेड़ इकाईयों के मुख्य अन्वेषक/सहायक—मुख्य अन्वेषक एवं केन्द्रीय भेड़ एवं ऊन अनुसंधान संस्थान के वैज्ञानिकों ने बैठक में भाग लिया। छ: इकाईयों द्वारा की गई प्रगति की समीक्षा की गई तथा कार्यक्रम में आगे सुधार हेतु सुझाव एवं सिफारिशें की गईं।

केन्द्रीय भेड़ एवं ऊन अनुसंधान संस्थान, अविकानगर में भेड़ सुधार पर नेटवर्क परियोजना की प्रक्षेत्र आधारित इकाईयों के वैज्ञानिकों/प्रोफेसरों/मुख्य अन्वेषकों के लिए “भेड़ों में मद समकालन एवं कृत्रिम गर्भाधान का प्रदर्शन” विषय पर दिनांक 1–7 अगस्त, 2013 तक प्रशिक्षण कार्यक्रम आयोजित किया गया। भेड़ सुधार पर नेटवर्क परियोजना की फार्म आधारित इकाईयों के स्टाफ ने भी “भेड़ों में मद समकालन एवं कृत्रिम गर्भाधान का प्रदर्शन” विषय पर दिनांक 11–17 फरवरी, 2014 तक केन्द्रीय भेड़ एवं ऊन अनुसंधान संस्थान, अविकानगर में आयोजित प्रशिक्षण कार्यक्रम में भाग लिया।

# 1. NETWORK PROJECT ON SHEEP IMPROVEMENT

## 1.1 INTRODUCTION:

The Network Project on Sheep Improvement (NWPSI) came into being on 1.4.1990, when all the centres of All India Coordinated Research Project on Sheep Breeding (AICRP-SB) were transformed into NWPSI Centres. The basic difference between AICRP-SB and NWPSI is that AICRP-SB was mainly focused on crossbreeding of genetically low yielding indigenous sheep breeds with high yielding exotic sheep whereas, in NWPSI emphasis has been given on the survey, evaluation and improvement of indigenous sheep genetic resources by selective breeding. Under NWPSI different breeds of sheep are being improved through selection and inter-se mating for wool and mutton production.

Presently, there are six ongoing cooperating centres of NWPSI in the country with its coordinating unit at Central Sheep and Wool Research Institute, Avikanagar, Tonk (Rajasthan). Four of these units are farm based units while two of them are field based units.

**1. Coordination Cell:** PC Cell, NWPSI, CSWRI, Avikanagar

## 2. Cooperating Units:

Sr. No	Location	Breed	Purpose
<b>A. Farm based cooperating units</b>			
1	ARC (CSWRI), Bikaner	Marwari sheep	Carpet Wool
2	CIRG, Makhdoom	Muzaffarnagri sheep	Dual purpose
3	MPKV, Rahuri	Deccani sheep	Dual purpose
4	SVVU, Palamner	Nellore sheep	Mutton
<b>B. Field based cooperating units</b>			
1	TANUVAS, Kattupakkam	Madras Red sheep	Mutton
2	ARC (CSWRI), Bikaner	Magra sheep	Carpet Wool

## 1.2 OBJECTIVES

The objective of NWPSI is genetic improvement of indigenous sheep breeds by selection.

## 1.3 TECHNICAL PROGRAMME

**(a) Farm based Technical Programme:** Under the farm based projects, technical programme aims at improvement of indigenous sheep breeds under farm conditions wherein the male lambs are first ranked using selection index. Index incorporates body weight at different ages and wool yield at six months of age in carpet wool breeds. Best lambs are selected and mated by the age of 18 months. Subsequently these rams are again evaluated based on their progeny performance and best rams are selected and used for breeding. Each unit is maintaining about 350 breedable ewes. Target is to achieve 500 breedable ewes. Each unit was to develop selection index for the selection of the rams. About 50 improved breeding rams will be developed every year for sale from each farm units for improvement of farmers flock. Performance evaluation of these rams in farmer's flock will be done. Selection indices developed by different units are given in Table 1.

Table 1. Selection criteria used in farm based units.

Breed	Selection Index
Marwari	$6.614(\text{six month body weight}) + 0.483 (\text{firs six monthly clip yield})$
Muzaffarnagri	Six month body weight
Deccani	Six month body weight
Nellore	Three and six months body weight and (sequential selection)

**(b) Field based Technical Programme:** In the field based units, each unit will have four centres from which one will be the ram-rearing centre. Each of the other three centres will cover a population of about 1500 sheep. Each centre is expected to cover several villages and within each village several sheep flock owners, those having 30 to 40 breedable ewes will be selected under the project. In the breeding tract of these breeds information will be collected on the best animals. Once these flocks are indentified at more than one location, selection of best adult males (for the first year) after proper verification of their age by dentition will be made. These selected males will be purchased. One of the four centres will maintain the breeding males which will have all the infrastructure facilities (Institute farm, if available). Subsequently ram lambs will be purchased based on body weight and wool cover. Purchased animals will be reared and recorded for body weight, wool production and wool quality up to 12 months of age to select best male.

During the breeding season these males will be distributed to flocks having 30-40 breedable females. After the breeding season, the males will be taken back to the ram rearing centre or redistributed to other farmers to be used in the next breeding season. At the time of lambing, data on the progeny born will be recorded. All the animals covered under this project will have unique number of identification provided by ear tagging/tattooing. Performance recording with respect to growth, wool production and reproduction of ewes and rams will be recorded. For the lambs born, the records will be maintained on weight immediately after the birth. Thereafter, the animals will be weighed at the time of weaning (90 days) and at the age of six months (180 days) and 12 months. The farmers will be motivated to shear these animals at around six months of age and the first greasy fleece weight will be recorded. A small sample of wool will be taken for wool quality analysis.

The data so collected will be analysed in detail and a suitable criteria/ selection index will be worked out for estimating breeding values of the sires. Depending on their breeding values, the best sire will be indentified. During each year at least 20 percent of the total rams shall be replaced by selecting superior males from the field.

For successful information collection, the incentives already being given and to be continued in future are adequate health control for the registered animals (prophylactic and curative, both), providing necessary guidelines and technical knowhow and making availability of breeding males (free breeding services). Semen quality evaluation of breeding rams distributed by field based units and breeding rams sold by farm based units should be done. Screening of rams for Brucella is also essential. Field units are exploring the possibilities of AI with freshly diluted liquid semen combined with estrus synchronization to accelerate superior germplasm dissemination. Use of the term 'free breeding services' instead of 'free supply of rams', because the ram belongs to the project and it will cover 2-4 flocks in its lifetime. Possibility of insurance of rams is being explored and at present being followed at Madras Red sheep unit.

#### 1.4. Targets:

Following targets were finalized during the Annual Review Meeting held during 16-17th November, 2013 at Jaipur.

##### A. Targets for Farm based Unit:

Particulars	Marwari		Deccani		Nellore		Muzaffarnagari	
	Male	Female	Male	Female	Male	Female	Male	Female
Body Weight at 6 month, kg	25	21	26	22	24	20	26	22
Body Weight at 12 month, kg	30	26	30	26	29	24	35	30
Lambing % (on ewes available basis)	85		85		85		85	
Mortality up to one year %	<5		<5		<5		<5	
Mortality Adult annual %	<5		<5		<5		<5	
Culling up to one year (%)	As per the requirement of the project							
Age at first lambing (days)	600		600		600		600	
Replacement rate %	30		30		30		30	
Annual greasy fleece wt. (kg)	1.50		-		-		-	
Sale of rams	50		50		50		50	

##### B. Targets for Field Based Units (Madras Red and Magra units):

Main targets for Field Based Units are coverage of at least 4500 breedable ewes, maximizing health coverage and distribution of breeding rams (100/ unit /year).

- Distribution of Rams: 100 No / year
- Identification and performance recording of progeny
- Introduction of AI with liquid semen.



## 2. UNIT-WISE PERFORMANCE OF NWPSI CENTRES

### 2.1 ARC (CSWRI), BIKANER (RAJASTHAN): MARWARI SHEEP FOR CARPET WOOL

**Project title:** Improvement of Marwari sheep for carpet wool production through selection.

Particulars	Target		Achievement	
	Male	Female	Male	Female
Body weight at 6 month, kg	25	21	28.3	23.3
Body weight at 12 month, kg	30	26	36.9	29.3
Lambing % (on ewes available basis)	85		85.86	
Mortality up to one year %	<5		3.21	
Mortality adult annual %	<5		1.61	
Culling up to one year (%)	As per need		12.25	
Age at first lambing (days)	600		692	
Replacement rate %	30		33.47	
Annual greasy fleece wt. (kg)	1.50		1.582	
Sale of rams	50		22	

#### Progress of work

#### Flock Statistics:

The opening and closing balance of Marwari flock during the year ending March 2014 was 800 and 841, respectively (Table 1). Additions were due to lambing (389) and purchase (14) and deductions were due to mortality (33), culling (236) and sale (32) to Government agencies/ NGO/ Farmers etc. Breedable ewes available were 446.

#### Culling and Mortality:

The overall mortality and culling irrespective of age were 2.92 and 11.67 per cent respectively. Age group wise details of culling, mortality and overall (culling + mortality) are presented in Table 2. A total of 2 rams, 20 hogget males and 9 hogget female ewes were sold. The culling and mortality rates were 0.18, 4.26, 15.43 and 20.93 and 2.83, 0.91, 0.95 and 2.31 % respectively in lamb, weaner, hogget and adult, respectively.

#### Reproduction:

The reproductive performance of Marwari ewes during year 2010-13 has been presented in Table 3. The overall tupping, lambing on available and bred basis were 93.20, 85.86 and 92.65 %, respectively. The ewe replacement rate was 33.47%.

#### Growth performance:

The data on growth performance of the lambs born during the year 2010 to 2013 were subjected to least squares analysis and results are presented in the Table 4. Overall least squares means for birth, 3, 6 and 12-month body



weight was 3.16, 16.02, 22.93 and 29.89 kg respectively. The Corresponding values for the year 2013 were 3.03, 16.60, 25.81 and 33.05 kg, respectively. The overall least squares means for daily body weight gain during 0-3 month, 3-6 month and 6-12 of the lambs born from 2010 to 2013 were 142, 76 and 36 g., respectively. Corresponding figures for the year 2013 were 151, 101 and 39 kg, respectively. Ewe Productivity Efficiency (EPE) was not calculated.

### Greasy Fleece Yield:

Wool yield data from 2010-2013 was subjected to least squares analysis and results are presented in table 5. The overall least squares means for adult spring, autumn, annual and lambs first and second clip during 2013 clip were 676, 930, 1582, 668 and 716 g, respectively. Wool samples of lambs born during the year 2013 were analysed for various wool quality traits. The least squares means for fibre diameter, medullation, staple length and crimp were 33.54 $\mu$ , 47.15 %, 5.62 cm and 0.63 per cm, respectively.

### Selection of the Rams:

Selection of rams was made based on index combining body weight and wool yield at 6 month of age ( $SI = 6.614 \times \text{weight at six months} + 0.483 \times \text{first clip greasy fleece yield}$ ). Ranking of the selected rams was made based on their index score. Last year top 21 rams were selected and used for breeding.

### Selection differential:

The selection differentials for 6 month weight and 1st six monthly GFY was 8.26 kg and 205 g, respectively. Expected and observed response to selection was not reported.

**Performance recording of progeny in field:** Recording not started.

**Table 1: Flock statistics for the year 2013-2014**

Age group	Opening balance		Closing balance	
	Male	Female	Male	Female
<b>0-3 Months</b>	101	99	99	100
<b>3-6 Months</b>	-	-	14	0
<b>6-12 Months</b>	68	57	30	23
<b>Adult</b>	72	403	129	446
<b>Total</b>	<b>241</b>	<b>559</b>	<b>272</b>	<b>569</b>

**Table 2: Annual survivability and culling 2013-2014**

Age Group	Culling (%)			Mortality (%)			Culling & mortality (%)		
	M	F	Total	M	F	Total	M	F	Total
<b>0-3M</b>	0.37	0.00	0.18	3.39	1.90	2.65	3.77 (265)	1.90 (263)	2.83 (528)
<b>3-6M</b>	4.70	3.79	4.26	1.17	0.63	0.91	5.88 (170)	4.43(158)	5.18 (528)
<b>6-12M</b>	13.08	17.87	15.43	0.93	0.96	0.95	14.01 (214)	18.84 (207)	16.38 (421)
<b>Adult</b>	34.95	15.58	20.93	1.45	1.66	2.31	36.40(206)	17.25 (539)	22.55 (745)

**Table 3: Reproduction performance for the period from 2010 to 2013**

Year	No. Available	No. Topped	No. Lambed	Tupping (%)	Lambing % (available basis)	Lambing % (Topped basis)
2010	419	379	335	99.47	87.92	88.39
2011	320	309	302	96.56	94.37	97.73
2012	414	400	375	96.66	90.57	93.75
2013	<b>382</b>	<b>354</b>	<b>328</b>	<b>93.20</b>	<b>85.86</b>	<b>92.65</b>

**Table 4 : Growth performance of Marwari lambs for the year 2010 to 2013 (kg.).**

Effect/trait	Birth Wt.	3M Wt.	6M Wt.	12M Wt.
$\mu$	<b>3.16±0.01 (1843)</b>	16.02±0.076 (1506)	22.93±0.108 (1317)	29.89±0.13 (767)
Year	**	**	**	**
2010	3.07±0.020 (669)	15.25±0.114 (597)	22.43±0.16 (545)	30.50±0.21 (268)
2011	3.39±0.02 (381)	16.19±0.15 (348)	21.85±0.21 (296)	28.47±0.24 (196)
2012	3.30±0.03 (262)	16.05±0.17 (247)	21.63±0.25(200)	27.52±0.27 (151)
2013	<b>3.03±0.03 (325)</b>	<b>16.60±0.15 (314)</b>	<b>25.81±0.22 (276)</b>	<b>33.05±0.28 (152)</b>
2014	3.02±0.037 (206)	--	--	--

**Table 5: Greasy fleece weight of Marwari adults and lambs (gm)**

Effect	Adult Clip			Lamb Clip	
	Spring	Autumn	Annual	First	Second
$\mu$	750.04±5.62 (1622)	676.99±5.03 (1809)	1453.10±9.36 (1449)	548.496±6.16 (1156)	735.12±7.50 (556)
Year	**	**	**	**	**
2010	821.70±8.66 (408)	612.60±6.55 (561)	1452.10±12.91 (384)	597.08±7.79 (546)	763.80±14.71 (140)
2011	792.05±7.6 (454)	511.78±7.71 (421)	1326.30±13.11 (375)	477.621±10.84 (282)	623.46±13.06 (175)
2012	775.7±9.46 (340)	653.27±8.08 (409)	1452.15±13.98 (323)	450.40±16.30 (125)	838.62±15.74 (117)
2013	676.82±8.11 (420)	930.32±7.40 (418)	<b>1582.00±12.13 (367)</b>	668.86±12.78(203)	716.21±15.43 (124)

Note : Within parenthesis is the number of observation.

**Table 6: Wool quality attributes of Marwari sheep.**

Effect	Diameter ( $\mu$ )	Hetro (%)	Hairy (%)	Medullation (%)	Staple length (cm)	Crimp (/ Cm)
$\mu$	36.62±0.16 (899)	40.21±0.32 (899)	14.92±0.28 (899)	54.90±0.34 (899)	5.44±0.06 (899)	0.64±0.01 (899)
Year	**	**	**	**	**	*
2010	36.25±0.34 (201)	39.55±0.66 (201)	16.03±0.58 (201)	55.59±0.90 (201)	5.17±0.13 (201)	0.64±0.02 (201)
2011	37.00±0.28 (296)	41.80±0.54 (296)	16.05±0.47 (296)	57.86±0.74 (296)	5.17±0.11 (296)	0.58±0.02 (296)
2012	39.96±0.38 (162)	43.81±0.73 (162)	16.55±0.64 (166)	59.01±1.00 (166)	5.82±0.15 (166)	0.70±0.03 (166)
2013	<b>33.54±0.31 (240)</b>	35.66±0.60 (240)	11.05±0.52 (240)	<b>47.15±0.82 (240)</b>	<b>5.62±0.12 (240)</b>	<b>0.63±0.02 (240)</b>

## 2.2 CIRG, MAKHDOOM (U.P.): MUZAFFARNAGRI SHEEP FOR MUTTON AND WOOL

**Project Title:** Genetic Evaluation and Improvement of Muzaffarnagri sheep for body weight and wool yield.

Particulars	Target		Achievement	
	Male	Female	Male	Female
Body Weight at 6 month, kg	26	22	27.9	24.9
Body Weight at 12 month, kg	35	30	39.3	31.4
Lambing % (on ewes available basis)	85		76.9	
Mortality up to one year %	<5		2.04	
Mortality Adult annual %	<5		2.25	
Culling up to one year (%)	As per need		4.81	
Age at first lambing (days)	600		639	
Replacement rate %	30		24.50	
Sale of rams	50		51	

### Progress of work

#### Flock Statistics:

The flock strength of Muzaffarnagri sheep for the year 2013-14 is presented in Table 1. The opening balance was 550 sheep while the closing (31. 03. 2014) was 590 sheep. The addition was due to birth of 219 lambs while the reduction was due to death (29), culling (66), transfer (19) and sale (65). 51 adult rams and 14 ewes were sold. Breeding ewes available were 284.

#### Culling and Mortality:

The overall culling in 0-3 month, 3-6 month, 6-12 age group and adults it were 2.34, 5.99, 6.56 and 5.32%, respectively. The mortality was recorded to be 1.69, 1.20, 4.04 and 2.25% in the 0-3 month, 3-6 month, 6-12 month age group and adults, respectively. The overall culling and mortality was 8.58 and 3.64%. The overall culling on health ground was 0.78%.

#### Reproductive Performance:

The reproductive performances of ewes in the year 2013 are depicted in Table 3. The annual tupping, lambing on available basis and lambing on bred basis were 93.4, 76.9 and 83.2%. Twinning significantly improved during this year as compared to previous years. Average weight at first service, age at first service, age at first lambing and ewes weight at lambing were 31.6 kg, 467 days, 639 days and 34.9 kg, respectively. Lambing performance needs improvement.

#### Growth Performance:

The data on growth traits generated over the years (2011-2013) were subjected to least squares analysis and results are presented in Table 4. The overall least squares means for body weight at birth, 3, 6, 9 and 12 months of age were 3.75, 16.84, 24.25, 29.07 and 33.41 kg respectively. Corresponding values for the year 2013 were 3.78,

18.18, 26.34, 30.78 and 35.49 kg respectively. The overall average daily weight gain (2013) at pre-weaning (0-3 month) and post-weaning (3-6, 6-9, 6-12 month) were 159, 107, 75 and 54 g respectively.

Ewe Productivity Efficiency (EPE) at birth weaning and six month of age were 4.33, 20.83 and 28.92 for ewes lambed during 2013. These figures for the year 2011 and 2012 were 4.06, 18.49, 25.78 and 4.10, 16.56, 25.61 kg, respectively.

### Greasy Fleece Yield:

The least-squares means for fleece yield at different clips are presented in Table 5. The overall least squares means for lambs 1st and 2nd season clip and adult annual clip were 502, 549 and 1257 g, respectively. In year 2013, the means for lambs first, second and adult annual clips were 478, 493 and 1119 g, respectively.

### Selection of Rams:

Selection of rams was done on the basis of 6-month body weight. Top 12 rams were selected and used for breeding. Semen quality parameters of breeding rams were evaluated before breeding.

### Selection Differential & Response to selection:

The selection differentials for 6-month body weight was 7.2 kg for year 2013-14. Details about response to selection were not given. The  $h^2$  estimates of birth, 3, 6, 9, 12 month body weight and first six monthly clips were 0.017, 0.098, 0.154, 0.451, 0.515 and 0.187 respectively. A total of 65 germplasm (51 rams and 14 ewes) were sold to various developmental agencies and progressive farmers for genetic improvement of the breed.

**Performance recording of progeny in field:** not reported. PI informed that work will be started after appointing SRF in the project.

**Table 1: Flock statistics:**

Age group	Opening balance as on 1.4.2013		Closing balance as on 31.3.2014	
	Male	Female	Male	Female
<b>0-3 Months</b>	46	34	29	42
<b>3-6 Months</b>	64	55	58	51
<b>6-12 Months</b>	05	07	8	16
<b>Adult</b>	70	269	102	284
<b>Total</b>	<b>185</b>	<b>365</b>	<b>197</b>	<b>393</b>

**Table 2: Annual culling and mortality percentage**

Age group	Culling (%)			Death (%)			Total (%)		
	M	F	Total	M	F	Total	M	F	Total
<b>0 – 3M</b>	1.99 (151)	2.70 (148)	2.34 (299)	1.32 (151)	2.03 (148)	1.69 (299)	3.31 (151)	4.73 (148)	4.01 (299)
<b>3 – 6M</b>	6.63 (181)	5.23 (153)	5.99 (334)	0.55 (181)	1.96 (153)	1.20 (334)	7.18 (181)	7.19 (153)	7.18 (334)
<b>6–12M</b>	8.41 (107)	4.39 (91)	6.56 (198)	3.74 (107)	4.39 (91)	4.04 (198)	12.15 (107)	8.79 (91)	10.61 (198)
<b>Adult</b>	0.65 (154)	7.46 (335)	5.32 (489)	0.00 (154)	3.28 (335)	2.25 (489)	0.65 (154)	10.75 (335)	7.57 (489)
<b>Overall</b>	8.62 (290)	8.56 (479)	<b>8.58</b> (769)	2.41 (290)	4.38 (479)	<b>3.64</b> (769)	11.03 (290)	12.94 (479)	<b>12.22</b> (769)

\* Culling on health ground = 0.78%

**Table 3: Ewes reproductive performance:**

Lambing season	ewes available	ewes tupped	Tupping %	No of Lambing	lambs born	Lambing %		Twining %
						Ewes available	Ewes tupped	
<b>2012-13</b>	298	259	86.9	202	243	74.3	86.7	20.3
<b>2013-14</b>	290	271	<b>93.4</b>	194	224	<b>76.9</b>	<b>83.2</b>	<b>14.9</b>

Replacement rate =  $66 \times 100 / 269 = 24.5\%$

**Table 4: Growth performance (kg.):**

Particulars	Birth wt.	3M Wt.	6M Wt.	9M Wt.	12M Wt.
<b>Overall mean</b>	3.75±0.02 (717)	16.84±0.15 (686)	24.25±0.25 (513)	29.07±0.28 (456)	33.41±0.33 (430)
<b>Year</b>	NS	**	**	**	**
<b>2011</b>	3.72±0.05 (278)	17.02±0.24 (274)	23.95±0.32 (257)	28.60±0.33 (250)	32.46±0.38 (235)
<b>2012</b>	3.75±0.04 (211)	15.33±0.28 (196)	22.46±0.40 (165)	27.82±0.43 (144)	32.30±0.50 (134)
<b>2013</b>	<b>3.78±0.04 (228)</b>	<b>18.18±0.27 (216)</b>	<b>26.34±0.53 (91)</b>	<b>30.78±0.66 (62)</b>	<b>35.49±0.75 (61)</b>

\*\* Significant ( $P > 0.01$ ), Figures within brackets are number of observation.

**Table 5 Greasy fleece yield (g) of Muzaffarnagari sheep:**

Particulars	Lambs Clip		Adult annual
	First season	Second season	
<b>Overall</b>	502.40± 7.40 (575)	549.07±08.84 (459)	1256.65±16.50 (714)
<b>Year</b>	**	**	**
<b>2011</b>	498.96±15.23 (123)	584.41±19.94 (115)	1410.65±19.62 (261)
<b>2012</b>	530.00±10.32 (268)	569.96±10.44 (220)	1239.93±23.68 (208)
<b>2013</b>	<b>478.25±12.45 (184)</b>	<b>492.83±13.84 (124)</b>	<b>1119.38±21.51 (245)</b>

\*\* Significant ( $P > 0.01$ ), Figures within brackets are number of observation.

**Table 6. Genetic and phenotypic parameters.**

Category	Birth Wt.	3 M Wt.	6 M Wt.	9 M Wt.	12 M Wt.	I Clip
<b>Birth Wt.</b>	<b>0.017±0.055</b>	0.491	0.398	0.316	0.265	0.179
<b>3 M Wt.</b>	0.814±1.022	<b>0.098±0.075</b>	0.751	0.583	0.433	0.370
<b>6 M Wt.</b>	0.116±0.967	0.484±0.342	<b>0.154±0.088</b>	0.875	0.729	0.423
<b>9 M Wt.</b>	< 0	0.485±0.293	0.994±0.054	<b>0.451±0.152</b>	0.856	0.305
<b>12 M Wt.</b>	< 0	0.286±0.342	0.864±0.148	0.967±0.026	<b>0.515±0.164</b>	0.291
<b>I Clip</b>	< 0	< 0	< 0	< 0	< 0	<b>0.187±0.096</b>

Diagonal  $h^2$  estimates, above diagonal are phenotypic, below diagonal genetic correlations

## 2.3 MPKV RAHURI (MAHARASHTRA): DECCANI SHEEP FOR MUTTON

**Project Title:** Network Project on Improvement of Deccani Sheep for dual purpose.

Particulars	Target		Achievement	
	Male	Female	Male	Female
Body Weight at 6 month, kg	26	22	23.31	21.40
Body Weight at 12 month, kg	30	26	27.02	25.18
Lambing % (on ewes available basis)	85		90.44	
Mortality up to one year %	<5		2.94	
Mortality Adult annual %	<5		8.00	
Culling up to one year (%)	As per need		8.58	
Age at first lambing (days)	600		637.08	
Replacement rate %	30		25.23	
Sale of rams	50		4 + 42*	

\* distributed

### Progress of work

#### Flock Statistics:

The total population of the Deccani sheep in beginning and at the end of the year (2013-2014) was 606 and 638, respectively. Addition in the flock was due to lambing (220) and reductions were due to death (43), sale (7) and culling (163). Breedable ewes available were 327. Details of the population statistics are presented in Table 1. Ewe replacement rate is 25.23 per cent. Overall mortality and culling on health ground in the flock was 5.12 and 12.28 per cent. Mortality and culling on health ground during the period under report is depicted in Table 2. The mortality in age groups viz. 0-3, 3-6, 6-12 month and adult was 3.93, 1.15, 3.68 and 8.00 per cent, respectively. The culling in age groups viz. 0-3, 3-6, 6-12 month and adult was 7.85, 8.07, 10.53 and 17.21 per cent, respectively. There was epidemic of PPR, which resulted in high mortality and higher rate of culling on health ground basis.

#### Reproductive Performance:

Annual reproductive performance for the year 2013-14 (lambing) is presented in Table 3. Topping percentage was 93.84. Lambing percentage based on ewes available was 90.44. The average age at first lambing and inter lambing period was observed to be 637.08 and 301.09 days respectively.

#### Growth Performance:

Growth data recorded on the lambs born during the year 2012-2013 is presented in Table 4. Average birth, three, six, nine and twelve months body weights for the year 2012-13 were 3.45, 16.05, 22.66, 23.52 and 25.96 kg respectively. Least squares means for body weights at birth, 3, 6 and 9 months of 2013-14 born lambs were 3.45, 16.20, 22.92 and 23.52 kg. Efforts are required to be made to improve the post weaning body weights. There is no improvement in body weight at different ages over last five years. Unit reported that targets were not achieved due to poor pasture conditions. Ewe Productivity Efficiency (EPE) was not calculated.

#### Greasy Fleece yield:

The overall least squares means for lambs 1st and 2nd season clip and adult annual clip were 435, 480 and 533 g, respectively.



### Selection of rams:

Preliminary selection of was done on the basis of body weight at six months and 11 rams were selected and the selection differential for six monthly body weights was 4.23 kg. But 4 animals selected were having six month body weight of less than 26 kg i.e. target value. It is better to use high quality rams for faster genetic improvement. Construction of selection index using important growth traits is to be done on priority basis.

### Response to Selection:

Response to selection of the rams used during 2013-14 was reported to be positive for six months weight. Heritability of body weight at birth, 3, 6, 9 and 12 months of age were 0.041, 0.035, 0.223, 0.153 and 0.211, respectively.

### Sale of breeding stock:

During the year under report 4 rams were sold for breed improvement programme. Unit reported that 46 rams were distributed to farmers, but details about method of distribution and flock and ewe coverage details were not given.

### Performance recording of progeny in field:

It has been reported that improvement of 8.4 % in birth weight and 8.6% in 3 months weight were observed in farmers flock from the progeny born from 46 rams which are distributed. Details about famers, village, ewes covered and method of identification and recording were not given in the report.

**Table 1: Flock statistics:**

Age group	Opening balance 1.04.2013		Closing balance 31.03.2014	
	Male	Female	Male	Female
0-3 Months	30	36	42	54
3-6 Months	22	42	45	47
6-12 Months	21	26	6	20
Adult	104	325	97	327
<b>Total</b>	<b>177</b>	<b>429</b>	<b>190</b>	<b>448</b>

**Table 2. Annual culling and death percentage for the year 2013–14**

Age group	Culling percentage on Health ground			Death percentage			Overall percentage		
	M	F	Total	M	F	Total	M	F	Total
0-3 months	10.19 (157)	05.75 (174)	07.85 (331)	04.46 (157)	03.45 (174)	03.93 (331)	14.65 (157)	09.19 (174)	11.78 (331)
3-6 months	09.65 (114)	06.84 (146)	08.07 (260)	01.75 (114)	00.68 (146)	01.15 (260)	11.40 (114)	07.53 (146)	09.23 (260)
6-12 months	13.86 (76)	08.77 (114)	10.53 (190)	06.58 (76)	01.75 (114)	03.68 (190)	19.74 (76)	10.52 (114)	14.21 (190)
Adult	27.50 (160)	13.35 (427)	17.21 (587)	09.37 (160)	07.49 (427)	08.00 (587)	03.87 (160)	20.84 (427)	25.21 (587)
<b>Total</b>	15.98 (507)	06.62 (861)	<b>12.28</b> (1368)	05.72 (861)	04.76 (806)	<b>05.12</b> (1368)	21.70 (861)	14.87 (806)	17.40 (1368)
<b>Up to 1 Year</b>	10.66 (347)	06.91 (434)	08.58 (781)	4.03 (347)	02.07 (434)	02.94 (781)	14.70 (347)	08.99 (434)	11.52 (781)

- Note: 1) Fig in parenthesis is the number of sheep available during the year.  
2) The culling percentage on health ground in flock was 12.28%  
3) Overall mortality percentage in flock was 5.127%



**Table 3: Reproduction performance :**

Period / Traits	Tupping (%)	Lambing (%) - ewes available	Age at first lambing (days)	Inter lambing period (days)	Twinning (%)
<b>2010 -11</b>	93.39 (223)	90.45 (202)	642.14±10.31 (28)	302.17 ± 07.42 (172)	2.10
<b>2011-12</b>	93.88 (261)	83.09 (231)	640.71±6.38 (44)	305.08 ± 02.95 (187)	1.30
<b>2012-13</b>	93.94 (265)	83.02 (220)	636.85±6.87 (36)	298.97±2.97 (184)	--
<b>2013-14</b>	<b>93.84</b> (305)	<b>90.44</b> (265)	637.08±6.60 (52)	301.09±2.54 (213)	1.02

Note: Figures in parenthesis indicates number of observations.

**Table 4: Growth performance of Deccani Sheep**

Particulars	Body weight (in kg)				
	Birth	3 Months	6 Months	9 Months	12 Months
<b>Overall mean</b>	3.45±0.01 (1470)	15.87±0.08 (1243)	22.27±0.12 (1029)	23.23±0.13 (845)	24.53±0.14 (554)
<b>Year</b>					
<b>2007-08</b>	3.39±0.03 (195)	15.58±0.19 (173)	22.28±0.26 (150)	23.55±0.25 (131)	24.68±0.29 (119)
<b>2008-09</b>	3.43±0.03 (200)	15.80±0.21 (158)	21.81±0.28 (140)	22.03 ±0.29 (101)	22.88±0.35 (80)
<b>2009-10</b>	3.52±0.03 (157)	16.01±0.12 (150)	22.53±0.30 (127)	23.39±0.28 (116)	24.14±0.34 (92)
<b>2010-11</b>	3.44±0.03 (202)	15.75±0.18 (194)	21.78±0.24 (180)	22.96±0.23 (163)	23.91±0.27 (139)
<b>2011-12</b>	3.43±0.02 (231)	15.71±0.17 (225)	22.21±0.21 (206)	23.66±0.23 (162)	25.57±0.27 (125)
<b>2012-13</b>	3.45±0.03 (220)	16.05±0.18 (200)	<b>22.66±0.25</b> (161)	23.52±0.24 (140)	<b>25.96±0.28</b> (124)
<b>2013-14</b>	3.45±0.03 (265)	16.20±0.21 (143)	<b>22.92±0.39</b> (65)	23.52±0.49 (32)	--

Note: Within parenthesis is the number of observations

## 2.4. SVVU, PALAMNER (ANDHRA PRADESH) :NELLORE SHEEP FOR MUTTON

**Project Title:** Network Project on Nellore sheep improvement.

Particulars	Target		Achievement	
	Male	Female	Male	Female
Body Weight at 6 month, kg	24	20	22.81	20.56
Body Weight at 12 month, kg	29	24	31.24	27.08
Lambing % (on ewes available basis)	85		85.10	
Mortality up to one year %	<5		4.01	
Mortality Adult annual %	<5		6.45	
Culling up to one year (%)	As per need		2.14	
Age at first lambing (days)	600		741	
Replacement rate %	30		39.25	
Sale of rams	50		104	

### Progress of work

#### Flock Statistics:

The opening and closing balance for the period under report was 682 and 649, respectively. Additions were due to lambing (280) and reductions were due to death (85), sale of breeding rams to farmers (104), emergency auction (33) and public auction (83) and missing (8). Ewe's replacement rate was 39.25 per cent. The details of population statistics have been presented in the Table 1. Breedable ewes available were 367.

The overall mortality percentage in 0-3 months, 3-6 months, 6-12 months and adult groups are 2.78, 4.62, 4.63 and 6.45 % respectively (Table 2). The overall culling percentage in 3-6 months, 6-12 months and adult groups are 4.18, 1.54 and 14.28 %, respectively (Table 2).

#### Reproduction:

The reproductive performance during the period under report is presented in Table 3. Overall tupping percentage was 96.35. During this year a total of 282 lambs were born. The overall lambing percentage was 85.10 based on the breedable ewes available and 88.32 based on the ewes tugged basis. There is improvement in reproductive performance over the years.

#### Growth Performance:

Results are presented in Table 4. Least square mean body weight of 2012-13 born lambs at birth, weaning, six months, nine months and 12 months of age were 3.15, 14.37, 22.10, 26.85 and 29.10 kg, respectively. Least square mean of 2013-14 born lambs for body weight at birth, weaning and six months were 3.12, 14.63 and 21.71 kg, respectively. There is significant improvement in growth performance.

#### Selection of rams:

Preliminary selection was done on the basis of sequential selection incorporating body weight at weaning and six months of age.

#### Selection Differential:

Selection differential of rams used during the year 2013-14 was 4.47 kg for three-month weight and 6.34 kg for six-month weight. Response to selection is not given.

### Sale of breeding stock:

During the year under report in about 104 adults rams were sold to different farmers for breed improvement programme.

**Performance recording of progeny in field:** not reported. PI informed that work will be started.

**Table 1: Flock strength**

Age group	Opening Balance		Closing Balance	
	Male	Female	Male	Female
0-3 Months	40	39	38	40
3-6 Months	81	102	90	77
6-12 Months	3	9	0	0
Adults	59	349	37	367
<b>Total</b>	<b>183</b>	<b>499</b>	<b>165</b>	<b>484</b>

**Table 2 : Annual Culling and Death Percentage for the year 2013-2014.**

Age group	Culling %			Death%			Overall%		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-3 Months	0	0	0	1.63 (183)	3.97 (176)	2.78 (359)	1.63 (183)	3.97 (176)	2.78 (359)
3-6 Months	4.48 (223)	3.89 (231)	4.18 (454)	5.38 (223)	0.86 (231)	4.62 (454)	9.86 (223)	7.79 (231)	8.81 (454)
6-12 Months	2.63 (114)	0.68 (145)	1.54 (259)	4.38 (114)	4.82 (145)	4.63 (259)	7.01 (114)	5.51 (145)	6.17 (259)
Adult	4.84 (165)	17.48 (486)	14.28 (651)	4.84 (165)	6.99 (486)	6.45 (651)	9.69 (165)	24.48 (486)	20.73 (651)

Note: Within parenthesis is the number of observations

**Table 3: Reproductive Performance:**

Lambing season	Ewes available for breeding	No. of ewes tupped	Tupping %	No. of Live lambs born	Lambing % based on	
					Breedable Ewes available	Ewes tupped
2012-13	345	304	88.11	278	80.57	91.45
2013-14	329	317	<b>96.35</b>	282	<b>85.10</b>	<b>88.32</b>

**Table 4: Least Square Means of body weights (Kg.).**

Effect	Birth Weight	Weaning Weight	6 Months Weight	9 Months Weight	Yearly Weights
<b>Year</b>					
2011- 12	3.07±0.02 (292)	10.31±0.17 (2596)	14.11±0.25 (226)	20.36±0.31 (1909)	25.72±0.34 (1886)
2012-13	3.15±0.02 (278)	14.37±0.16 (271)	<b>22.10±0.23</b> (256)	26.85±0.27 (247)	<b>29.10±0.31</b> (240)
2013-14	3.12±0.03 (280)	14.63±0.18 (245)	<b>21.71±0.32</b> (163)	-	-

Note: Within parenthesis is the number of observations

## 2.5 TANUVAS, KATTUPAKKAM (TAMIL NADU): MADRAS RED SHEEP FOR MUTTON

**Project Title:** Evaluation and genetic improvement of Madras Red sheep for mutton production in farmers' flocks.

Particulars	Target	Achievement
Breedable Ewes covered	> 4500	3857
Distribution of ram	100	95 ( 63 new distribution + 32 redistribution)

### Progress of Work

Madras Red Sheep is one of the important meat breeds of Tamil Nadu. Sheep skins are preferred in tanning due to better grains in fine sheep leather. This is a field based unit. As envisaged in the technical programme four centres of project were established as below. Livestock Research Station, Kattupakkam identified as ram rearing Centre.

Centre I : Ponmar, Madurapakkam, Kayarambedu and Mevalurkuppam

Centre II : PGRIAS, Kattupakkam, Sasthrampakkam and Veerapuram (ram rearing centre)

Centre III : Kondamangalam, Sirukundram, Otteri, Kazhanipakkam, Thenmelpakkam and Rayamangalam

Centre IV : Aanoor, Vayalur, Mettukudisai, Periyavaiyavur and Andavakkam

The work of registration of flocks in the villages, identification of breedable ewes by tattooing, performance recording of rams, sheep were protected from various disease by adopting preventive measures against parasites, contagious diseases and nutritional deficiencies at all the Centres was continued during the year.

### Flock Statistics:

The population of sheep covered (127 sheep farmers) under this scheme during the year 2013-14 was 8984, of which 3037 were young and 5947 were adult. The population of sheep were 2583, 1383, 2218 and 2800 for centre I, II, III and IV. The centre-wise flock statistics is given in Table 1.

### Health Control Programme and Disease Incidence

Sheep were vaccinated against PPR, Sheep Pox and Enterotoxaemia. Sheep were dewormed thrice with fenbendazole/ivermectin against helminths. Fenbendazole was replaced with ivermectin as FECRT indicated resistance against the drug. A total of 22292 vaccinations were given against PPR, Sheep Pox and Enterotoxaemia. 22699 sheep were drenched for control of internal parasites. 16492 animals were detected for non specific diseases during the period. The incidence of general and systemic, alimentary system, respiratory system and other diseases were 69, 13, 10 and 8 %, respectively. Screening of rams for Brucella was initiated.

### Reproduction:

Centre wise & village wise reproductive performance for the year 2013-14 is given in Table 2. A total of 3857 ewes were available during the year and gave birth to 3302 lambs. 85.62 per cent lambing was observed during the year. Topping percentage and weight of ewe at mating were not reported.

## Growth Performance:

Body weights at birth, three, six, nine and twelve months are given in Table 3. Overall mean of body weights for lambs born during 2012-13 for birth, weaning, six, nine and twelve months were 2.59, 11.62, 15.57, 19.47 and 21.13 kg, respectively. Body weights for the lambs born during the year 2013-14 for birth and weaning were 2.58 and 11.53 kg respectively. It was observed that best performance was noticed in centre III, followed by centre IV. Larger areas under pasture and agriculture helps in better nutrition for the sheep maintained in the region. Several villages in centre I face problems of urbanization with large areas under agriculture converted for buildings, leading to diminishing pastures.

At present about 593 lambs out of 3302 born were under recording for growth performance. Performance recording of lambs may be extended to cover all the lambs born from supplied rams for effective performance evaluation.

## Distribution of rams:

During 2013-14, a total of 63 rams were purchased and distributed to various centres and additionally 32 rams were redistributed among breeders. A total of 146 distributed rams were available with farmers and at Centre I, II, III and IV were 35, 41, 28 and 42 rams, respectively.

## Selection Differential

Average selection differential was 6.2 kg at one year of age. Suitable selection criteria or selection index incorporation body weight at different ages may be developed for effective selection.

## Estrus Synchronization and Artificial Insemination

Synchronization of ewes and fixed time AI /mating was implemented in farm flock at LRS, Kattupakkam for testing and unit assured that steps are taken to extend the technique to field flocks.

## Demonstration of supplementary feeding

Field demonstration on supplementary feeding of concentrates was demonstrated in Madurapakkam village. Three treatment groups with rate of feeding at 250g/day, 125g/day and no concentrate feeding were formed. Six month age hoggets were fed for one month during dry/lean season. Body weight gain obtained in hogget was 88, 63 and 61 g per day in the three treatment groups, respectively.

**Table1: Flock statistics for the year 2013-14.**

Centre	Young	Adult	Total	Rams	Ewes available
I	830	1753	2583	35	1047
II	448	935	1383	41	565
III	728	1555	2218	28	919
IV	1051	1749	2800	42	1326
<b>Grand Total</b>	<b>3037</b>	<b>5947</b>	<b>8984</b>	<b>146</b>	<b>3857</b>

**Table2: Ewes reproductive performance.**

Year	Number of ewes available for breeding	No. of ewes lambded single	Total No. of live lambs born	Lambing %
2011-12	4662	4032	4032	86.40
2012-13	3697	3157	3157	85.39
2013-14	3857	3302	3302	<b>85.62</b>

**Table 3: Growth Performance (2010 - 2013)**

Effects under study	Birth wt. (kg)	3 months wt. (kg)	6 months wt. (kg)	9 months wt. (kg)	12 months wt. (kg)
<i>Year</i>					
2010-11	2.83 ± 0.005 (3831)	11.36 ± 0.017 ( 3675)	15.46 ± 0.010 (2839)	19.28 ± 0.016 (1903)	22.31 ± 0.041 (1198)
2011-12	2.89 ± 0.003 (4032)	11.54 ± 0.011 (3870)	15.89 ± 0.074 (2102)	19.42± 0.077 (1942)	23.09± 0.079 (1589)
2012-13	2.59 ± 0.047 (550)	11.62 ± 0.132 ( 872)	<b>15.57 ± 0.22</b> (479)	19.47 ± 0.49 (152)	<b>21.13 ± 0.22</b> (448)
2013-14	2.58 ± 0.045 (565)	11.53 ± 0.147 (593)	-	-	-

## 2.6 ARC, CSWRI, BIKANER (RAJASTHAN): MAGRA SHEEP FOR CARPET WOOL

**Project Title:** Evaluation and genetic improvement of Magra sheep in farmers' flock.

Particulars	Target	Achievement
Breedable Ewes covered	> 4500	7117 ewes registered, ewes covered not given
Distribution of ram	100	23

### Progress of work

As per the decision taken during the annual review meeting and recommendations of QRT, Magra field based unit was shifted from RAJUVAS, Bikaner to ARC, CSWRI, Bikaner with effect from 01.04.2013. As envisaged in the technical programme, four centres of project were established at Kotra, Jaalwali, Kanasar and ARC. The ARC centre was functioned as ram rearing centre. The technical inputs were given in the form of treatment of diseased animals and advisory services for management and breeding of animals at each of the centre.

### Flock Registration and coverage:

New centres were indentified viz. Kotra, Kanasar and Jaalwali areas in the breeding track to Magra sheep. The centre-wise flock details registered under the project as on 31.03.2014 is given in Table 1. A total of 11448 sheep were registered and out of which, 7117 were adult ewes.

### Health Control Programme and Disease Incidence:

The health control programme was taken up during the year 2013-14 as one of the major inputs in the form of deworming and vaccination against infectious disease (sheep pox and enterotoxaemia). The total number of cases handled as prophylactic measures for deworming and vaccination were 9456 and 7600 respectively. A total of 3331 cases were treated for various ailments at three centres. The frequency of alimentary tract disease were highest followed by respiratory disorder. Details of mortality are not given.

### Base line survey

An extensive survey was initiated in the project area after finalization of three centres in the field. The overall average means of birth weight, three month weight, six month weight and one year body weight were  $3.06 \pm 0.34$  (326),  $12.51 \pm 0.19$  (471),  $19.05 \pm 0.33$  (312) &  $27.25 \pm 0.31$  (381) kg., respectively. Performance at Kanasar centre was superior in comparison of other centres up to six month of age. There is significant and wide difference in growth performance between the centres and reasons needs to be studied.

**Reproduction:** not given

**Growth Performance:** not given

**Greasy Fleece Yield and Wool quality:** not given

**Distribution of Rams:**



A total of 109 rams were purchased and out of these, a total of 23 rams were distributed to the registered breeders at Kotra centre.

**Selection differential:** not given

### Demonstration of supplementary feeding

Field demonstration on supplementary feeding by complete feed blocks was demonstrated in Madholai village and Jalwali village. At Madholai village, pre weaning lambs fed with feed blocks had 132 g per day daily gain compared to 97 g per day gain obtained by feeding *Zizyphus nummularia* leaves. At Jalwali village, pre weaning lambs fed with feed blocks had 136 g per day daily gain compared to 85 g per day gain obtained by feeding Guar phalgati.

**Table1: Flock statistics (as on 31.03.2014):**

Name of Centre	Breeders	Adult female	Number of Registered Sheep
Kotra	35	2432	4781
Kanasar	36	3470	4626
Jaalwali	21	1215	2041
<b>Total</b>	<b>92</b>	<b>7117</b>	<b>11448</b>

**Table 2: Base line performance: Growth performance (Kg.):**

Particulars	BWT	3WT	6WT	12WT
Overall	3.06 ±0.34 (326)	12.51±0.19 (471)	19.05 ±0.33 (312)	27.25 ±0.31 (381)
Sex				
Male	3.13 ±0.36 (171)	13.03 ±0.27 (215)	20.07 ±0.43 (165)	29.68 ±0.41 (187)
Females	2.98 ±0.32 (155)	12.08 ±0.25 (256)	19.05 ±0.51 (147)	24.89 ±0.42 (194)
Centre				
Kotra	2.87 ±0.23 (158)	10.69 ±0.16 (200)	15.37 ±0.19 (164)	27.62 ±0.28 (198)
Jaalwali	2.84 ±0.21 (40)	11.82 ±0.22 (141)	17.76 ±0.25 (46)	28.88 ±0.28 (40)
Kanasar	3.35 ±0.42 (128)	16.07 ±0.45 (130)	25.55 ±0.45 (102)	26.27 ±0.67 (143)



### 3. INFRASTRUCTURAL SETUP OF NWPSI UNITS

**3.1 STAFF POSITION:** The staff position is given as on 31.3.2014

#### 3.1.1. Project Coordination Cell, CSWRI, Avikanagar :

Dr. S. M. K. Naqvi,  
Director & Project Coordinator (Sheep Breeding)  
CSWRI, Avikanagar

Dr. L. Leslie Leo Prince  
Incharge, PC Cell, Sr. Scientist (AGB)

Mr. N. C. Gupta  
Technical Officer, Animal Genetics & Breeding Division

#### Contractual Services at PC Cell, CSWRI (as on 31.03.2014)

No	Name of Posts	Number of Posts		
		Sanction	Filled	Vacant
1.	S R F (Temporary)	1	-	1**
2.	Office Assistant/ Accounts Clerk *	1	1	-
3.	Office attendant*	1	1	-
	Total	3	2	1**

\* Contractual services, \*\* Recruited during July, 2014

#### 3.1.2 Cooperating Units located at SAU's (as on 31.03.2014)

No	Unit	Number of Posts								
		Deccani			Nellore			Madras Red		
	Name of Posts	Sanction	Filled	Vacant	Sanction	Filled	Vacant	Sanction	Filled	Vacant
1.	Professor	1	1	-	1	1	-	1	1	-
2.	Assistant Professor	1	1	-	1	1	-	1	1	-
3.	Technical Assistant / Livestock Assistant	1	1	-	1	1	-	1	1	-
4.	L.D.C	1	1	-	1	1	-	1	1	-
5.	RA / SRF (Temporary)	1	1	-	1	1	-	1	1	-
	Total	5	5	0	5	5	0	5	5	0

#### 3.1.3 Cooperating Units located at ICAR Institute (as on 31.03.2014)

Unit	Post of SRF : Status		
	Sanction	Filled	Vacant
<b>Marwari</b>	1	-	1*
<b>Magra</b>	1	-	1*
<b>Muzzafarnagri</b>	1	-	1*

\* Recruited during July, 2014

### 3.2. Meeting and training held during 2013-14

- Training program on “Demonstration of Estrus Synchronization and Artificial Insemination (AI) in Sheep” for scientists/ Professors/ PIs of field based units of Network Project on Sheep Improvement was conducted during 1-7th August, 2013 at CSWRI, Avikanagar.
- Staff of the farm based units of Network Project on Sheep Improvement was also participated in Training program on “Demonstration of Estrus Synchronization and Artificial Insemination (AI) in Sheep” conducted during 11-17th February, 2014 at CSWRI, Avikanagar.
- Annual Review Meeting to review the performance made during 2012-13 was held at Jaipur on 16-17th, November, 2013 under the chairmanship of Dr. K.M.L.Pathak, DDG (Animal Science). Dr. R.S.Gandhi, ADG (AP&B), Dr. Vineet Bhasin, Principal Scientist, ICAR, PIs/Co-PIs from six sheep units and scientists from CSWRI were participated in the meeting. Progress made by the six units was reviewed and suitable suggestions and recommendations were provided for further improvement in the programme.

### 3.3 Budget Allocation for the year 2013-14 ( as per RE)

(Rs. In Lakhs)

Type Location	PC Cell	Farm Based Units				Field Based Units		Total	ICAR share*	State Share
	ICAR	ICAR	ICAR	SAU	SAU	ICAR	SAU			
Head/ Unit	PC Cell, CSWRI, Avikanagar	Marwari, ARC, Bikaner	Muzaffarnagari, CIRG, Makhdoom	Nellore, SVVU, Tirupati	Deccani, MPKV, Rahuri	Magra, ARC, Bikaner	Madras Red, TANUVAS, Chennai			
<b>A. Revenue</b>										
Salaries	0.00	0.00	0.00	37.67	29.33	0.00	29.33	96.33	<b>72.25</b>	24.08
Domestic TA	0.60	0.65	0.40	1.33	1.07	0.80	1.33	6.18	<b>5.25</b>	0.93
Research and Operational Expenses	3.65	23.60	20.60	32.00	29.33	18.40	33.33	160.91	<b>137.25</b>	23.66
HRD (within India)	0.00	0.00	0.00	0.00	0.00	1.50	1.34	2.84	<b>2.50</b>	0.34
<b>Total (A)</b>	<b>4.25</b>	<b>24.25</b>	<b>21.00</b>	<b>71.00</b>	<b>59.73</b>	<b>20.70</b>	<b>65.33</b>	<b>266.26</b>	<b>217.25</b>	<b>49.01</b>
<b>B. Capital</b>										
Livestock	0.00	1.00	0.00	2.00	2.00	6.00	3.67	14.67	<b>12.75</b>	1.92
<b>Total (B)</b>	<b>0.00</b>	<b>1.00</b>	<b>0.00</b>	<b>2.00</b>	<b>2.00</b>	<b>6.00</b>	<b>3.67</b>	<b>14.67</b>	<b>12.75</b>	<b>1.92</b>
<b>Grant Total (A + B)</b>	<b>4.25</b>	<b>25.25</b>	<b>21.00</b>	<b>73.00</b>	<b>61.73</b>	<b>26.70</b>	<b>69.00</b>	<b>280.93</b>	<b>230.00</b>	<b>50.93</b>
<b>ICAR Share</b>	<b>4.25</b>	<b>25.25</b>	<b>21.00</b>	<b>54.75</b>	<b>46.30</b>	<b>26.70</b>	<b>51.75</b>	<b>230.00</b>	-	-
<b>State Share</b>	<b>0.00</b>	<b>0.00</b>	<b>0.00</b>	<b>18.25</b>	<b>15.43</b>	<b>0.00</b>	<b>17.25</b>	<b>50.93</b>	-	-

\* ICAR Share is calculated as 100% funding to units located under ICAR and 75% funding to units located under SAUs

## 4. Publications

### 4.1. Research papers published/accepted:

1. Mane, P. M., Pachpute, S. T. and Nimase, R. G. (2014). Growth and reproductive performance of Deccani sheep. *The Indian Journal of Small Ruminants*. (Accepted for publication).
2. Nirban, L K; Joshi, R.K; Narula, H.K; Pannu, U and Singh, H .2013. Genetic, phenotypic and environmental trends of growth and wool traits in Marwari sheep, *Veterinary Practitioner* (Accepted for publication).
3. Nirban, L. K., Joshi, R. K. Narula, H. K., Singh, H. and Bakar, S. (2013). Estimates of heritability for growth and wool traits in Marwari sheep at arid region of Rajasthan, *Indian Journal of Animal Research* (Accepted for publication).
4. Nirban, L. K., Joshi, R. K., Narula, H. K., Singh, H. and Kumar, Pardeep. (2013). Effect of genetic and non genetic factors on greasy fleece yield of first and second clip in Marwari sheep. *Veterinary Practitioner* (Accepted for publication).
5. Singh, H., Pannu, U., Narula, H. K., Chopra, A. and Netra, V. (2013). Heritability estimates of growth traits in Marwari sheep in arid region of Rajasthan. *Veterinary Practitioner* (Accepted for publication).
6. Singh, H., Pannu, U., Narula, H. K., Chopra, A. and Murdia, C. K. (2013). Influence of genetic and non genetic factors on pre weaning growth in Marwari sheep. *The Indian Journal of Small Ruminants*, 19 (2) 142-145.
7. Venkataramanan, R., Subramanian, A., Sivaselvam, S. N., Sivakumar, T., Sreekumar, C., Anilkumar, R. and Iyue, M. (2013). Pedigree Analysis of the Nilagiri breed of sheep from South India. *Animal Genetic Resources Information*, 53:11-18

### 4.2. Research abstracts published/presented:

1. Gopal Dass (2013). Evaluation of wool production and quality of Muzaffarnagri sheep. Published in the compendium of Interactive Meeting on “Prospects in improving production, marketing and value addition of carpet wool” organized by ISSGPU, CSWRI & CIRG at ARC of CSWRI, Bikaner on 31 December, 2013, Page No.52.
2. Gopal Dass (2014). Evaluation of production and reproduction traits of Muzaffarnagari sheep. Published in the compendium of National Symposium on “Harmonizing phenomics and genomics for sustainable management of livestock for upliftment of rural masses” held at NBAGR, Karnal from February 6-7, 2014, Page No.146.
3. Mane P. M., Pachpute, S. T. and Nimase, R.G. (2014). Studies on mortality pattern of Deccani sheep in an organized farm. National seminar on sheep and goat biodiversity and breeding policies- issues and prospective, Mahabaleshwar, Pune, Maharashtra, 21 to 22 .02.2014, pp 193.
4. Mohd Ayub, Sharma, P. R. and Narula, H. K. (2013). Effect of Scientific health expertise on Morbidity and Mortality in arid region of Rajasthan. Interactive meeting on “*Prospects in improving production, marketing and value addition of carpet wool*” ARC, CSWRI, Bikaner on 31.12.2013, pp 64.

5. Narula, H.K., Ashish Chopra, Sharma, P.R., Vimal Mehrotra and Patel, A.K., (2014). Wool Production and Its quality of Magra Sheep in Arid Zone of Rajasthan. National Seminar on "*sheep and goat biodiversity and breeding policies-issues and perspective*" KNP College of Veterinary Science, Shirwal, Satara, Maharashtra on 21-22 February, 2014, pp 546.
6. Narula, H.K., Ashish Chopra, Sharma, P.R., Vimal Mehrotra and Patel, A. K. (2013). Wool production and its quality of Marwari sheep under hot arid zone of Rajasthan. Interactive meeting on "*Prospects in improving production, marketing and value addition of carpet wool*" ARC, CSWRI, Bikaner on 31.12.2013, pp 53.
7. Nimase, R. G., Pachpute, S. T. and P. M Mane (2014). Ante partum prolapse in Deccani sheep and its remedial measures. National seminar on sheep and goat biodiversity and breeding policies- issues and prospective, Mahabaleshwar, Pune, Maharashtra, 21 to 22.02.2014., pp 511.
8. Nimase, R. G., Pachpute, S. T. and Mane P. M. (2014). Successful relieving of dystocia due to incomplete dilation of cervix by cesarean in sheep. National seminar on sheep and goat biodiversity and breeding policies- issues and prospective, Mahabaleshwar, Pune, Maharashtra, 21 to 22 .02.2014. pp193.
9. Pachpute, S. T., Mane, P. M. and Nimase, R. G. (2014). Effect of slaughter age on mutton quality and quantity in Deccani Sheep. National seminar on sheep and goat biodiversity and breeding policies- issues and prospective, Mahabaleshwar, Pune, Maharashtra, 21 to 22.02.2014, pp 544.
10. Patel, A.K., Narula, H. K., Ashish Chopra, Sawal, R.K. and Omprakash (2013). Improvement in farmers' flock of Arid Region of Rajasthan through Magra field unit. Interactive meeting on "*Prospects in improving production, marketing and value addition of carpet wool*" ARC, CSWRI, Bikaner on 31.12.2013, pp 68.
11. Sawal, R. K., Patel, A. K., Narula, H. K. and Chopra, A. (2013). Nutrient delivery in the form of complete feed blocks for sheep. Interactive meeting on "*Prospects in improving production, marketing and value addition of carpet wool*" ARC, CSWRI, Bikaner on 31.12.2013, pp 60.
12. Sawal, R. K., Narula, H. K. and Ayub, M. (2013). Feed resource availability for animal production under field condition in Bikaner. Interactive meeting on "*Prospects in improving production, marketing and value addition of carpet wool*" ARC, CSWRI, Bikaner on 31.12.2013, pp 59.
13. Vinay Chaturvedi, Nitika Sharma, H. A. Tiwari, Ashok Kumar, Shivasharanappa, N, A. K. Mishra, Souvik Paul, S. V. Singh, Gopal Dass and M. K. Singh (2014). Surgical repair of Atresia Ani in new born kids and lambs. Published in the compendium of National Seminar & Annual Conference on "*Sheep and goat biodiversity and breeding Policies – Issues and Perspectives*" held at Shirwal, Maharashtra from 21-22 February, 2014, Page No. 511.

#### **4.3. Seminars and workshops in which the PI/Scientists of the units have participated:**

1. Dr. Gopal Dass Participated in State Level Seminar on "Challenges and strategies for conservation of small ruminants in India" from 9-10 October, 2013 at DUVASU, Mathura, UP.
2. Dr. Gopal Dass Participated in International Seminar on "Vishva ki pragati men vigyan evam

prodyogiki ka yogdan held at Metkaf House, DRDO, Ministry of Defence, New Delhi held during December 05-07, 2013.

3. Dr. Gopal Dass Participated in Brain Storming meeting on “Strategy related to conservation and productivity enhancement of farm animal genetic resources“ jointly organized by ICAR and TAAS at NASC Complex, DPS Marg, New Delhi on January 10, 2014.
4. Dr. A. K. Patel participated in Sharing workshop on “Assessment of impact of grazing by small ruminants on natural resources and surrounding environment of pasture/rangelands located in different agro-climates” at Central Soil and water Conservation Research and training Institute, Dehradun from May 15-16, 2013.
5. Dr. A. K. Patel participated in National Workshop on “Managing resources for optimizing of land productivity in thar desert” under SUMAMAD-Phase II project at Central Arid Zone Research Institute, Jodhpur on July 19, 2013.
6. Dr. A. K. Patel, Dr. R K Sawal, Dr. H K Narula, Dr. Ashish Chopra, Dr. M Ayub attended Interactive meeting on “*Prospects in improving production, marketing and value addition of carpet wool*” ARC, CSWRI, Bikaner on 31.12.2013.
7. Dr. A. K. Patel participated in Workshop on “Managing arid agriculture in changing climate” under National Initiative on Climate Resilient Agriculture at Central Arid Zone Research Institute, Jodhpur.
8. Dr. H. K. Narula and Dr. Ashish Chopra attended National Seminar on "*sheep and goat biodiversity and breeding policies-issues and perspective*" KNP College of Veterinary Science, Shirwal, Satara, Maharashtra on 21-22 February, 2014
9. Dr. Ashish Chopra attended XI National Symposium on “Harmonizing Phenomics and Genomics for Sustainable Management of Livestock for Upliftment of Rural Masses”, NBAGR, Karnal on 6- 7 February, 2014
10. Dr. M. Ayub participated in XII Annual Conference of IAVPHS, 4th-5th February, Guwahati.
11. Dr. R. G. Nimase, Assistant Professor has attended the Annual conference of ISSGPU-2014 and National Seminar on “ Sheep and Goat Biodiversity and Breeding Policies- issues and Perspective” held on 21st and 22nd February 2014 at Mahabaleshwar, organised by Dept. of Animal Reproduction, Gynaecology and Obstetrics, Krantisinh Nana Patil College of Veterinary Science, Shirwal, MAFSU.
12. Dr. Mane P. M., Research Associate, attended training on “Demonstration of Oestrus Synchronization and Artificial Insemination (AI) in Sheep” held at CSWRI, Avikanagar on 11-17th Feb 2014.
13. Dr.C.Sreekumar, Professor and Dr. R. Venkataramanan, Assistant Professor participated in the National Conference on “Current Nutritional Concepts in Productivity Enhancement of Livestock and Poultry”..
14. Dr. Sreekumar, C., Professor, attended the “Seminar on Ruminant Vaccines” organized by SEPPIC, France, Hyderabad on November 26, 2013.
15. Dr. C. Sreekumar, Professor participated in the XIV National Conference of “Veterinary Parasitology”, College of Veterinary Sciences, Thrissur on February 5 –7, 2014.



## 5. Action Taken Report (ATR) on the Recommendations made in the Annual Review Meeting (NWPSI) held on 16-17th November, 2013 at Jaipur

<b>General recommendations (Network Project on Sheep Improvement)</b>	
<b>Recommendations</b>	<b>Action Taken</b>
1. All the PIs should fully devote their time for implementation of the technical programme in totally and timely submission of financial, technical and other reports.	PIs were instructed accordingly. Recommendation implemented.
2. The lambing percentage should be $\geq 85\%$ on ewes available basis with overall mortality rate be less than 5 percent. Special care needs to be taken to keep pre-weaning mortality under control.	Recommendation implemented. Above 85% lambing observed in Marwari, Deccani and Nellore units. Pre-weaning mortality is under control in Marwari, Muzzafarnagri and Nellore units. 7.85 % pre -weaning mortality observed in Deccani unit.
3. More number of rams should be distributed to the farmers to have more ewe coverage.	Recommendation implemented. About 181 rams were sold and 86 rams were distributed. Marwari, Madras Red and Magra units needs to increase the sale/ distribution.
4. All the units should ensure maintaining the quality breeding stock only.	Recommendation implemented. PIs assured that quality breeding stock are being maintained
5. Infrastructure facility should be strengthened to maintain breeding stock as per the technical programme.	Recommendation implemented. Funds under the head minor works have been allocated in XII Plan EFC.
6. All the farm units should aim to achieve the separate body weight targets prescribed for males and females (table enclosed as Annexure I) within the stipulated time period.	Recommendation implemented. Marwari, Muzzafarnagri and Nellore units achieved most of the body weight targets. Deccani unit did not achieve the target.
7. Per ewe productivity should be calculated to evaluate the improvement over the years.	Recommendation implemented. EPE of Muzzafarnagri sheep calculated. Other units assured that EPE will be calculated and presented
8. Implementation of AI is must for all the farm based units.	PIs/ staff of farm unit undergone training on AI at CSWRI, Avikanagar. PIs assured that AI will implemented during 2014-15.
9. Each unit should ensure proper identification of animals in the field flocks by tagging/tattooing as well as verify and monitor the recording of data.	Identification of rams by ear tagging and progeny by tattooing is being followed by Madras Red unit. Magra unit yet to start the animal identification.
10. PIs of all the units should preferably be from Animal Breeding background; if not, at least one Co -PI should have specialization in Animal Breeding for effective implementation of the project activities.	Recommendation implemented. PI or Co-PI are from Animal Breeding background in all the sheep units.
11. No unit can unilaterally change the PI without consultation and prior approval of the Coordinating unit/ Council.	PIs assured that necessary information was conveyed to university authorities.
12. Performance recording, evaluation and reporting of the field flocks be continued to know the improvement in the farmers' flock.	Recommendation implemented. PIs assured that recording is under progress or it will be started during 2014-15.
13. Data reporting should be uniform as per the given format.	Recommendation implemented.
14. Socio economic impact analysis of the project should be carried out by the units.	PIs assured that impact analysis will be carried out during 2014-15.

<b>Specific recommendations:</b>	
<b>Farm Based Units under NWPSI</b>	
<b>Marwari Unit:</b>	
1. Efforts should be made to improve the Greasy Fleece Weight by introduction of high performing germplasm from the field. Target of annual GFY is revised to 1.5 kg from 2.0 kg.	Recommendation implemented. Improvement in annual GFY is observed.
2. Ram distribution should be increased to fulfil the target. Availability of rams should be made at the farmer's doorstep in the actual breeding tract for which the recurring contingency can be utilized.	A total of 22 rams/hoggets were sold. PI assured that all efforts are being made to achieve the target.
<b>Muzaffarnagari Unit:</b>	
1. Requisite infrastructure facilities to accommodate the required number of breeding stock should be created. The necessary provision of construction of two sheds will be made in XII plan EFC.	Due to limitation of funds, allocation has been made under minor works for renovation of existing infrastructure.
2. The flock management work can be carried out through contractual services from the recurring contingency budget.	PI informed that necessary action in this regard had been taken and assured that administrative issues will be resolved.
3. The negative genetics in body weight should be critically evaluated over the years to draw the reasons for such performance and necessary corrective measure should be initiated within next two month.	PI assured that data were critically analysed and 10 best sire lines were maintained. Details will be presented in the meeting.
<b>Deccani Unit:</b>	
1. The required number of breedable stock should be achieved by 31 <sup>st</sup> March, 2014.	There is no increase in number of breedable ewes even after addition by purchase, due to high culling and mortality in the flock.
2. Appropriate measures should be taken to improve post weaning growth rate and overall performance of the flock.	PI informed that appropriate measures were taken, but there is no improvement in growth performance and targets were not achieved.
3. More number of flocks should be covered by the distributed rams.	Recommendation implemented. But flock and ewe coverage details were not given.
<b>Nellore Unit:</b>	
1. Appropriate measures should be taken to reduce the mortality rate in the age group of 6-12 months.	Recommendation implemented. Mortality is less than 5% and is under control.
2. The selection criteria should be properly followed as per the technical programme.	Recommendation implemented. Sequential selection based on three and six months body weight is being followed.

### Field Based Units under NWPSI

<b>Field Based Units under NWPSI</b>	
<b>Madras Red Unit:</b>	
1. Possibilities should be explored to implement AI in the coverage areas under the project.	Synchronization and fixed time AI was practiced in farm flock at LRS, Kattupakkam. PI assured that AI will be introduced in field flocks during 2014-15.
2. Topping percentage should be calculated and reported.	PI informed that topping percentage was not calculated as rams are being kept along with ewes round the year. Lambing of 85.6 % was reported.
3. Supplementary feeding should be continued in the project area, especially during lean season and flushing.	Recommendation implemented. Field demonstration of supplementary feeding was done and enhanced body weight gain was observed in supplemented group.
<b>Magra Unit:</b>	
1. Project work should be implemented in the new areas identified.	Project initiated in three new centres covering 92 flocks.



## 6. OBSERVATIONS OF PROJECT COORDINATOR

### **Marwari Unit:**

Targets of body weight at six and twelve month of age were achieved. Annual lambing of above 85% was achieved. Reduction in age at first lambing and sale of breeding rams needs improvement. Performance recording of progeny born in field is to be started on priority.

### **Muzaffarnagari Unit:**

Targets of body weight at six and twelve month of age were achieved. Observed and expected response to selection need to be compared. Lambing performance needs improvement. Fifty one breeding rams were sold. Performance recording of progeny born in field is to be started on priority.

### **Deccani Unit:**

Efforts are required to be made to improve the body weight at six and twelve months of age. Targets of body weights were not achieved. Annual lambing of above 90% was achieved. Sale of breeding rams needs improvement. Performance recording of progeny born in field is to be strengthen with more details.

### **Nellore Unit:**

Targets of body weight at six and twelve month of age were achieved. Annual lambing of above 85% was achieved. Details about response to selection were not given. 104 breeding rams were sold. Performance recording of progeny born in field is to be started on priority.

### **Madras Red Unit:**

Activities related to health coverage were observed satisfactory. Sixty three rams were distributed and 32 rams were taken back and redistributed. Implementation of AI with liquid semen with oestrus synchronization needs to be started in farmers flock.

### **Magra Unit:**

New areas identified and base line survey, flock registration completed. Twenty three rams were distributed and needs improvement. Identification and performance recording of progeny with respect to growth, reproduction, wool yield and quality needs to be started on priority basis. Pilot trial on AI with liquid semen with oestrus synchronization needs to be started in farmers flock.