भेड़ सुधार नेटवर्क परियोजना

NETWORK PROJECT ON SHEEP IMPROVEMENT

भाकृअनुप
ICAR

परियोजना समन्वयक की वार्षिक प्रतिवेदन

PROJECT CO-ORDINATOR'S ANNUAL REPORT

Compiled By

Dr. S. M. K. Naqvi, Director, CSWRI & Project Coordinator
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01.04.2012 to 31.03.2013

केन्द्रीय भेड़ एवं ऊन अनुसंधान संस्थान
अविकानगर (वाया–जयपुर) राजस्थान

CENTRAL SHEEP & WOOL RESEARCH INSTITUTE
AVIKANAGAR – 304 501 INDIA

PREFACE

The annual report of the Network Project on Sheep Improvement (NWPSI) for the period 01-04-2012 to 31-03-2013 has been compiled using reports obtained from different units. The funds allocated by the Council for the year 2012-13 are presented.

I thank P.I's / Scientist Incharges of all the Units for their valuable contributions to make it possible to compile this report. The staff of Animal Genetics and Breeding Division deserves deep appreciation for their all out devotional 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 Dr. A. L. Arora, Incharge Project Coordinator (Sheep Breeding) during the period of reporting for his overall monitoring, effective supervision, advice and guidance. 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.

CSWRI
Avikanagar

(L. Leslie Leo Prince)
Incharge, PC Cell

NETWORK PROJECT ON SHEEP IMPROVEMENT: PROJECT TEAM

(A) COORDINATING UNIT, CSWRI, AVIKANAGAR

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

Dr. A. L. Arora
Incharge, Project Coordinator (Sheep Breeding) (up to 11.04.2012)

Dr. L. Leslie Leo Prince
Sr. Scientist (AGB) & Incharge, PC Cell (from 12.04.2012)

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

(B) COOPERATING UNITS

S. No.	Name of the Units		Name of the Unit Incharge
1.	**C.S.W.R.I., Avikanagar** Chokla Unit ***(Unit continuing as Institute Project w.e.f 01.04.2013)***	:	**Dr. Ashish Chopra** Scientist (AGB)
2.	**A.R.C. (CSWRI), Bikaner** Marwari Unit	:	**Dr. H.K. Narula** Sr. Scientist (AGB)
3.	**C.I.R.G., Makhdoom** Muzzafarnagri Unit	:	**Dr. Gopal Dass** Sr. Scientist (AGB)
4.	**M.P.K.V., Rahuri** Decanni Unit (Farm Based)	:	**Dr. Y. G. Fulpagare** Professor (Animal Science)
5.	**S.V. V. University,** **LRS Palamner** Nellore Unit	:	**Dr. B. Ekambaram** Professor (AGB))
6.	**R.A. J. U.V.A.S., Bikaner** Magra Unit ***(Unit shifted to ARC, Bikaner w.e.f 01.04.2013)***	:	**Dr. C. K. Murdia** Associate Professor (AB&G)
7.	**T.A.N.U.V.A.S., L.R.S, Kattupakkam:** Madras Red Unit		**Dr. H. Gopi** Professor & Head, LRS
8.	**O.U.A.&T., Bhubaneswar** Ganjam Unit ***(Unit discontinued w.e.f 31.03.2013)***	:	**Dr S. K. Dash** Associate Professor (AGB)
9.	**M.P.K.V., Rahuri** Decanni Unit (Field based) ***(Unit discontinued w.e.f 31.03.2013)***	:	**Dr. U. Y. Bhoite** Associate Professor (AGB)

Webpage: http://www.cswri.res.in/network_project_on_sheep_improvement.asp
Facebook: https://www.facebook.com/pages/Network-Project-on-Sheep-Improvement/342846002513676

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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 2011-12, there are ten centres of NWPSI including farm based units at CSWRI, Avikanagar (Chokla, carpet Wool), ARC (CSWRI), Bikaner (Marwari, carpet wool), CIRG, Makhdoom (Muzaffarnagri, Dual type), MPKV, Rahuri (Deccani, Dual type) and SVVU, Palamner (Nellore, Mutton), SDAU, Sardarkrushinagar (Patanwadi, Dual type) and field-based units at RAJUVAS, Bikaner (Magra, Carpet wool) and TANUVAS, Kattupakkam (Madras Red, Mutton), OUAT Bhubaneswar (Ganjam, mutton) and MPKV, Rahuri (Deccani, Dual type) . Field-based unit of Ganjam Sheep at Orissa University of Agricultural Technology, Bhubenshwar started functioning from July 2001. Two new units, Farm Based Unit on Patanwadi sheep at SDAU, Sardarkrushinagar and Field Based Unit on Deccani sheep at MPKV, Rahuri were sanctioned during the XI plan and project sanctioned from 01.04.2009 and actual project work started from September, 2009.

Council decided to close the Patanwadi centre and it will not be continued in XII plan. Deccani filed based unit and Ganjam field based units will be discontinued from 01.04.2013 as per the Council's decision. Magra unit at RAJUVAS will be closed on 31.03.2013 and will be shifted to ARC, CSWRI, Bikaner and will continue from 01.04.2013. Chokla farm based unit will be shifted to ARC, CSWRI, Bikaner and will continue up to 31.03.2013 under NWPSI and later it will continue as Institute research project of CSWRI.

The 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 and wool yield at six months of age. Best lambs are selected and mated with tester ewes by 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 in improver flock. Each field-based unit has four centres including a ram-rearing centre, covering a sheep population of about 1500 sheep per centre. The superior male lambs are selected from the farmers' flocks on the basis of GFY1 and 6-month body weigh in Magra sheep and on six-month body weight basis in Madras Red and Ganjam sheep. Male lambs are initially identified at 3 month of age and are finally selected after first shearing. Selected male lambs from improver flocks are supplied for breeding to base flocks. Unit wise results of the Network Project on Sheep Improvement are summarized below:

Chokla Unit, CSWRI, Avikanagar: Least squares means for birth, three, six and twelve months body weights of year 2012 born lambs were 2.88, 13.71, 21.84, and 26.23 kg respectively. The greasy fleece yield in first six monthly clips, adult six monthly and adult annual were 1.188, 1.193, and 2.173 kg respectively. *Tupping percent and lambing percent on ewes available basis was 99.49 and 103.22, respectively. Five breeding rams and seventy adult females were sold to Animal Husbandry Department Sheep breeding farm, Fatehpur. Council decided to continue as Institute research project from 01.04.2013 and not under NWPSI.*

Marwari Unit, Arid Region Campus (CSWRI), Bikaner: A*verage body weight at birth, 3, 6, 9 and 12- month of age during the period 2012-13 were 3.41, 15.74, 22.01, 24.37 and 28.43 kg respectively*. The overall tupping and lambing on ewes available basis were 96.66% and 90.57% respectively. The average diameter and medullation were 36.76µ and about 56.05%. The overall survivability was 96.64%. *A total of 38 Marwari ram/ram lambs were sold to various agencies for sheep improvement programme.*

Muzaffarnagar Unit, CIRG, Makhdoom: The least square means for birth, three, six, nine and 12 month body weights of year 2012 born lambs were 3.72, 16.92, 21.63, 26.52 and 31.71 kg respectively. Tupping was 86.9 percent. Lambing percent based on ewes available and tupped was 74.3 and 86.7 respectively. *A total of 58 rams were sold to various agencies for sheep improvement programme.*

Deccani Farm based Unit, MPKV, Rahuri: Average body weight at birth, weaning, 6 months, 9 months, and 12 months of age were 3.43, 15.67, 22.14, 23.61 and 25.60 kg respectively. The tupping percentage was 93.94 while the lambing based on ewes available was 83.02 %. *Unit supplied 07 breeding rams/ ram lambs to the various agencies for sheep improvement* programme.

Nellore Unit, SVVU, LRS Palamner : The overall means for body weight at birth, three, six, nine and 12 months of age were 3.08, 10.42, 14.21, 20.32 and 25.57 kg respectively. *During the year under report in about 93 rams were sold to different farmers for breed improvement programme*

Magra Unit, R. A. J. U. V. A. S., Bikaner: The average body weights at birth, 6 and 12 months and adult stage were 2.95, 19.93, 27.10 and 38.75 kg respectively. Average greasy fleece weight at 6-month age and adult annual were 1058 and 2213, respectively. *A total of 39 rams were distributed to various centres. Council decided to discontinue and it was shifted to ARC, CSWRI, Bikaner and continuing from 01.04.2013.*

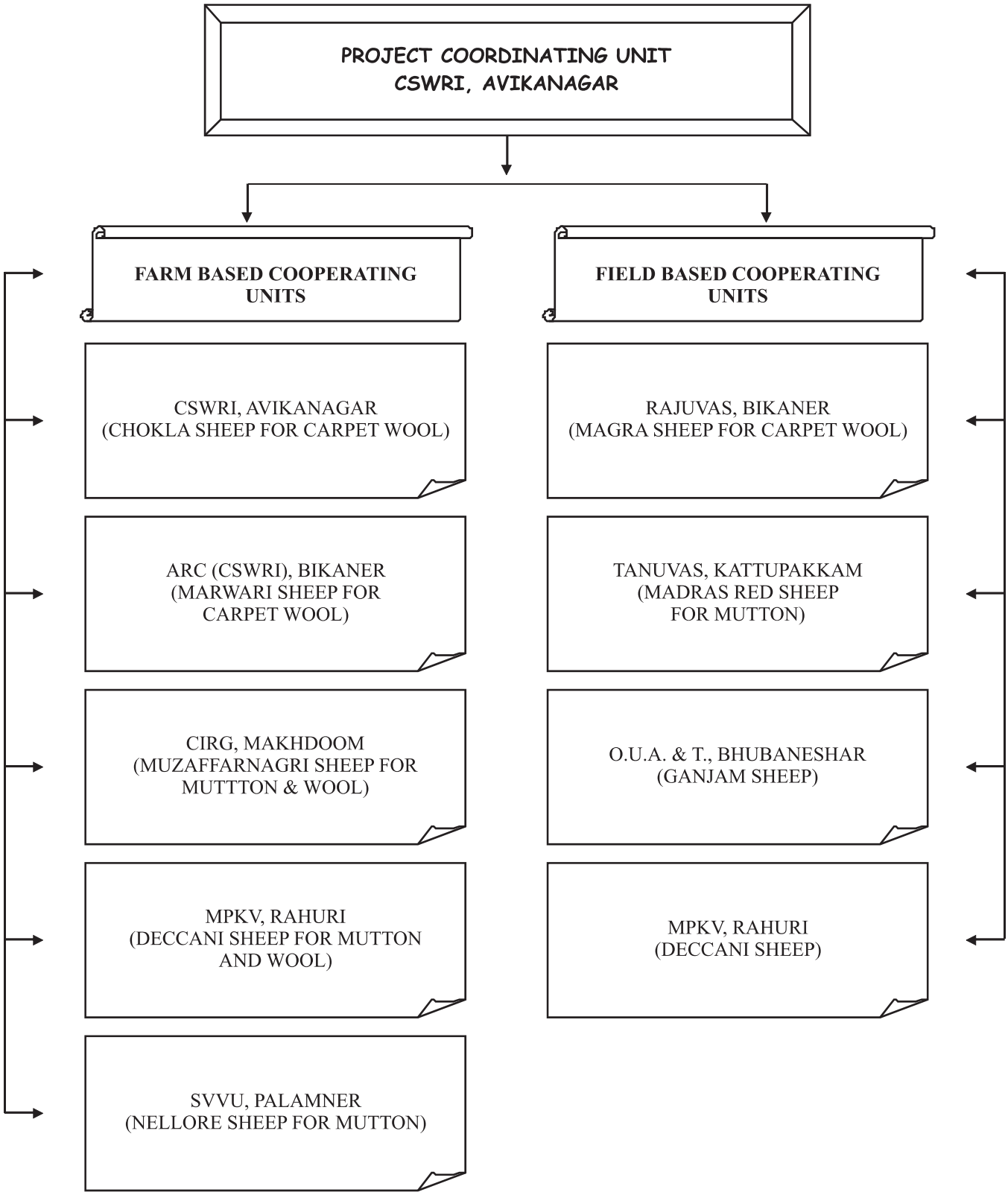
Madras Red Unit, T.A.N.U.V.A.S., LRS Kattupakkam : Overall mean of body weights for lambs born during 2012 for birth, weaning, six, nine and twelve months were 2.83, 11.36, 15.89, 19.42 and 23.09kg, respectively. 85.39 per cent lambing was observed during the year. *A total of 105 ram were distributed to various centres.*

Ganjam Unit, OUAT, Bhuabaneswar: Overall mean of body weights for birth, weaning, six and twelve months were 2.80, 11.72, 17.08, 21.68 and 24.74 kg during 2012-13. 81.94 per cent lambing was observed during the year. Council decided to discontinue the unit from 01.04.2013.

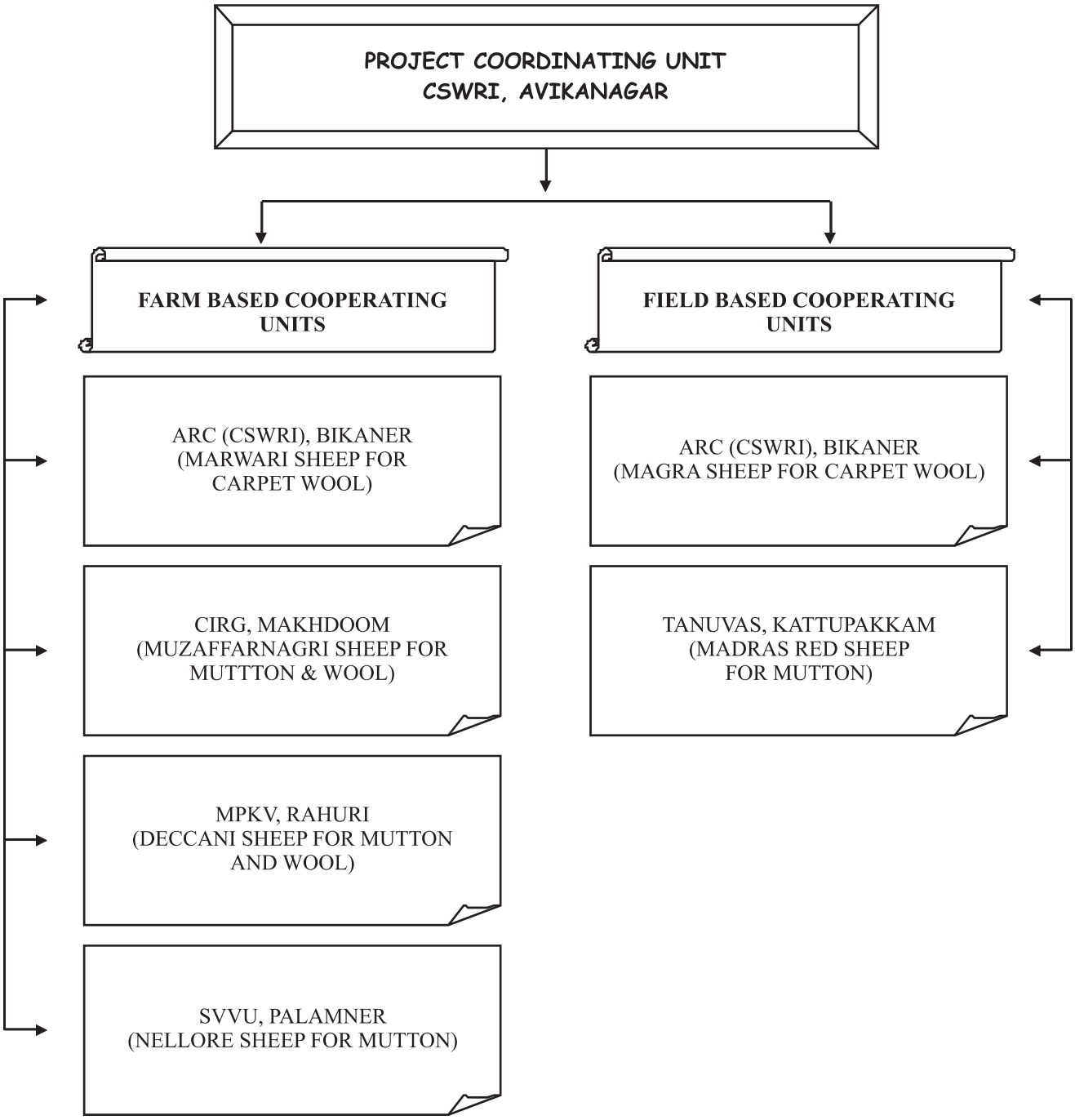
Deccani Field based Unit, Mahatma Phule Krishi Vidyapeeth Unit, Rahuri: The overall means of body weights of adopted flock for birth, 3, 6, 9 and 12-months of age were 3.29, 14.35, 21.00, 23.61 and 27.95 kg respectively. *29 selected elite Deccani rams were procured and distributed. Performance recording of progenies born from the supplied rams is in progress. Council decided to discontinue the unit from 01.04.2013.*

From 01.04.2013 onwards 4 farm based units such as Deccani, Nellore, Marwari and Muzzafarnagri and 2 field based unit such as Madras Red and Magra units will continue under NWPSI.

NETWORK PROJECT ON SHEEP IMPROVEMENT
(during 2012-13)



NETWORK PROJECT ON SHEEP IMPROVEMENT
(from 01.04.2013 onwards)



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 centers of All India Coordinated Research Project on Sheep Breeding (AICRP-SB) were transformed into NWPSI Centers. 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, conservation 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 nine ongoing cooperating centres of NWPSI in the country with its coordinating unit at Central Sheep and Wool Research Institute, Avikanagar, Tonk (Rajasthan). Five of these units are farm-based units while four of them are field-based units.

Two new units, Farm Based Unit on Patanwadi sheep at SDAU, Sardarkrushinagar and Field Based Unit on Deccani sheep at MPKV, Rahuri were sanctioned during the XI plan and project sanctioned from 01.04.2009 and actual project work started from September, 2009. Patanwadi Sheep Unit is discontinued from 31.03.2012 and not included in the XII Plan proposal.

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

2. Cooperating Units

S. No.	Location	Breed	Purpose
A. Farm based Cooperating units			
1	CSWRI, Avikanagar	Chokla sheep	Carpet Wool
2	ARC (CSWRI), Bikaner	Marwari sheep	Carpet Wool
3	CIRG, Makhdoom	Muzaffarnagri sheep	Dual purpose
4	MPKV, Rahuri	Deccani sheep	Dual purpose
5	SVVU, Palamner	Nellore sheep	Mutton
B. Field-based Cooperating units			
1	RAJUVAS , Bikaner	Magra sheep	Carpet wool
2	TANUVAS, Kattupakkam	Madras Red sheep	Mutton
3	OUAT, Bhubneshwar	Ganjam Sheep	Mutton
4	MPKV, Rahuri	Deccani sheep	Dual purpose

(Chokla unit will be converted to Institute Research Project from 01.04.2013, Magra Unit at RAJUVAS will be shifted to ARC, CSWRI, Bikaner from 01.04.2013, Deccani Field based unit, MPKV and Ganjan Unit, OUAT will be discontinued from 01.04.2013.)

1.2 OBJECTIVES

The objective of NWPSI is

- Genetic improvement of indigenous sheep breeds by selection.

1.3 TECHNICAL PROGRAMME

The Technical Programme of NWPSI is conceptually based on selection and progeny testing of indigenous sheep breeds with the involvement of institutional and field based flocks. Registered flocks owners in the field, with a specified flock strength (30-40 breedable ewes), are identified and are incorporated in the field-based TP of the project to enhance the efficiency of PT scheme and to obtain superior germ plasm from field, as well. The field-flocks are provided with various incentives and facilities to obtain better cooperation from them towards the project. These incentives provided are:

i. Adequate health control measures to the flocks (prophylactic and curative, both).
ii. Essential guidelines and technical knowledge about profitable sheep industry.
iii. Supply of superior breeding rams.

(a) Farm-based Technical Programme: Under the farm based projects, a base flock of 250 ewes is maintained and after getting the lambing from this flock, preliminary selection of the ram lambs is done at six month of age on the basis of an index incorporating body weight and wool weight at six month of age. Those preliminary selected ram lambs at about 1.5 years of age are mated to the Tester flock. The progenies from these mating are reared and used for evaluating those ram lambs. In this process the ratio of ram: ewes are 1:20. After evaluation of these ram lambs, best 4-6 rams of highest merit are selected for crossing with Improver flock. Now the superior ram lambs produced through these mating are to be used as sires for base flock whereas the female progenies are to be used as replacement for Base Flock. In this way, the cycle is repeated over years to get the desired improvement in the flock. During the whole process flock is kept open to introduce superior genotypes in the flock and vice-versa. Each unit is maintaining 250 breedable ewes. Target is to achieve 500 breedable ewes. Each unit was to develop selection index, for the selection of the rams. Selection indices developed by different units are given in Table 1. Male lambs were selected using selection index and mated with tester ewes by the age of 18 months. These breeding rams are further selected based on their progeny performance and were used for breeding in improver flock.

Table 1. Selection indices developed in farm based units

Breed	Selection Index
Chokla	0.507 VI wt. + 2.956 GFYI
Marwari	1.26504 VI wt.+ 0.70942 GFYI
Muzaffarnagri	VI wt
Deccani	VI wt.
Nellore	15.102 IIIwt + VIwt

(b) Field-based Technical Programme: In the ongoing, Field based technical programme, 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. Only those flocks will be included which are having at least 30-40 breedable ewes. The main selection criteria is body size whereas the Tamil Nadu unit is also collecting information on carcass traits and skin quality.

Once these flocks are identified at more than one location, selection of adult males is made by dentition and these males are procured. After procurement, these rams are reared at Ram Rearing Centre, with all infrastructural facilities. During breeding seasons, these males are distributed to the flocks with 30-40 breedable ewes. Preferably, these males are distributed in more than two centres. After breeding season these males are returned back to the Ram Rearing Centre to be used in next breeding season.

Progeny born through these mating are recorded and the breeding value of used rams is evaluated and used extensively for genetic improvement programmes. During each year at-least 20 percent of the total rams shall be replaced by selecting superior males from the field and the rams so registered shall be passed on to the base group. The best rams identified in the above programme shall be allotted to certain properly identified flocks and these identified flocks shall always be allotted the best males in each generation. Therefore, the whole population shall have three groups of breedable ewes at a time.

Base group: A group of ewes, to which the rams selected from our own registered breeders, shall be used in each generation.
Test group1: A group of ewes, to which the superior rams (progeny tested), will be allocated.
Test group2: A group of ewes, to which the rest rams will be allocated each year.

This programme will be continued until sufficient information on effectiveness of this programme is collected and attempts will be made to identify methods by which the use of superior rams could be maximised. The possibilities in this direction are -

1. Establishment of a superior ewe flocks (Improver flock) at one of the centres.
2. Extension of breeding season for these rams.
3. Use of synchronized lambing and artificial insemination with liquid chilled semen..

2. UNIT-WISE PERFORMANCE OF NWPSI CENTERS

2.1 CSWRI, AVIKANAGAR (RAJASTHAN) : CHOKLA SHEEP- CARPET WOOL

Project Title: Evaluation and improvement of Chokla sheep for carpet wool.

EXPERIMENTAL RESULTS

Flock Statistics:

The opening and closing balance of the experimental flock of Chokla sheep at Avikanagar for the year 2012-2013 was 627 and 289, respectively. Addition was due to lambing (258). Reductions were due to death (114), culling (210), slaughter/predation (3), sale (77) and transfer to ARC, Bikaner (192). At the end of the year, there were 125 males and 164 females in different age groups at Avikanagar and 47 males and 189 females in different age groups at ARC, Bikaner. Adult ewes replacement rate during the year was 29.53 per cent. Adult rams were retained in the flock for distribution/sale to the State Govt. Deptt / NGOs. for improvement programmes. 7 rams and 70 ewes were sold. Population Statistics are presented in Table 1.

Pre-weaning, post weaning (3-6 month, 6-12 month) and adult mortality (death + culling on health ground) was 16.34, 12.95, 4.75 and 3.51 percent, respectively. Percent culling (health ground) in adult stage was 0.37 percent. Results are given in Table 2. Overall mortality during the period was12.88 percent. Post-mortem finding revealed that pneumonia caused the highest (45.3%) mortality.

Reproduction:

In general the animals were bred in two breeding seasons (spring and autumn) and about 75% percent of the breedable ewes were covered in major breeding season (autumn). But during last year round the year mating was practiced to improve the breeding efficiency. Lambing percentage based on ewe's available basis and tupped basis was 103.22 and 105.88 % respectively (Table 3). There is significant improvement in the reproductive performance.

Growth performance:

Data on growth performance generated from the lambs born during the year 2009 to 2012 were subjected to least squares analysis. Least squares means of body weight at various ages are presented in Table 4. The overall least squares means of body weights at birth, three, six and twelve months of age were 2.88, 13.71, 21.81 and 26.23 kg, respectively. Corresponding values for the year 2012-2013 were 2.86, 12.37, 17.17, and 26.23 kg, respectively. Overall least squares means of average daily body weight gain between 0-3 and 3-6 months were 1212 and 94 g, respectively. Corresponding values for the 2012 born lambs were 108 and 65 g.

Greasy Fleece Yield and wool quality:

The least square means for greasy fleece weights (2009-2012) are presented in Table 5. Overall least squares means for 1st six monthly greasy fleece yield (GFY1), adult six monthly and adult annual greasy fleece yields were 1.188, 1.193 and 2.173 kg, respectively. Corresponding values for the year 2012 clips were 0.780, 1.056 and 2.212 kg, respectively. Genetic and non-genetic factors had significant effect on greasy fleece yield. Highest first six monthly GFY was achieved during previous year was maintained during 2012 clips. Average fibre diameter was 32.52, Medullation was 20.20%. Staple length was 5.47cm for adult males and corresponding values for adult females were 31.74, 35.11% and 5.98cm.

Selection of rams:

Selection of rams was based on index combining body weight and wool yield at 6 month of age.(x 0.507 wt. + x 2.959 GFY). Ranking of the selected rams was made based on their index score. Last year top 19 rams were selected for breeding. The selection differential of the rams used during 2012-2013 was 3.28 kg for six-month weight and 252 gm kg for GFYI. 5 rams and 70 ewes were sold.

Table 1: Flock statistics (01.04.2012 to 31.3.2013)

Age group	Opening balance		Closing balance at Avikanagar		Closing balance at ARC,Bikaner	
	Male	Female	Male	Female	Male	Female
0-3 Months	28	20	21	33	21	19
3-6 Months	42	34	04	03	0	2
6-12 Months	62	80	27	26	5	5
Adult	36	325	73	102	21	163
Total	168	459	125	164	47	189

Table 2: Annual culling and death percentage for the year 01.04.2012 to 31.03.2013

Age group	Culling % on Health ground			Death %			Overall %		
	M	F	T	M	F	T	M	F	T
0-3M	0.00 (152)	1.94 (154)	0.98 (306)	15.79 (152)	14.93 (154)	15.36 (306)	15.79 (152)	16.87 (154)	16.34 (306)
3-6 M	0.00 (149)	0.77 (129)	0.36 (278)	15.44 (149)	9.30 (129)	12.59 (278)	15.44 (149)	10.07 (129)	12.95 (278)
6-12 M	0.61 (162)	0.00 (175)	0.30 (337)	5.55 (162)	3.43 (175)	4.45 (337)	6.16 (162)	3.43 (175)	4.75 (337)
Adult	0.83 (120)	0.23 (421)	0.37 (541)	1.67 (120)	3.56 (421)	3.14 (541)	2.5 (120)	3.89 (421)	3.51 (541)

Note: 1. Over all mortality percent, irrespective of age group was 12.88 %.
2. Within parenthesis is the number of sheep available during the period.

Table 3: Ewes reproductive performance

Year	Ewes available (for breeding)	No. of ewes tupped	Tupping %	No. of live lambs born	Lambing % on available basis	Lambing % on tupped basis
2008	252	244	96.8	218	86.51	89.34
2009	289	281	97.2	274	94.81	97.51
2010	289	283	97.92	262	90.66	92.58
2011	348	345	99.13	361	103.74	104.64
2012	279	272	97.49	236+52 (288)	103.22	105.88

Table 4: Least square means of body weight for the period 2009-2013(kg)

Particulars	Birth weight	Weaning weight	6- month weight	12 month weight
Overall mean	2.88±0.02 (1250)	13.71±0.08 (1050)	21.84±0.14 (824)	26.23±0.31 (636)
Year	*	**	**	**
2009	2.91±0.03 (278)	14.44±0.16 (246)	25.19±0.24 (235)	31.38±0.23 (198)
2010	2.98±0.03 (353)	14.64±0.14 (319)	24.96±0.24 (243)	29.35±0.21 (235)
2011	2.77±0.03 (375)	13.37±0.14 (311)	20.03±0.23 (243)	25.07±0.23 (196)
2012	**2.86±0.03 (244)**	**12.37±0.19 (174)**	**17.17±0.36 (103)**	**19.34±1.20 (07)**

Note: Within parenthesis is the number of observation.

Table 5: Least square means of greasy fleece yield for the period 2009-2012(kg)

Particulars	1st six monthly GFY	Adult six month GFY	Adult annual GFY
Overall mean	1.188±0.01 (833)	1.193±0.01 (2538)	2.173±0.02 (937)
Year	**	**	**
2009	1.496±0.02 (194)	1.210±0.01 (564)	2.016±0.03 (203)
2010	1.273±0.02 (205)	1.151±0.01 (653)	2.063±0.03 (238)
2011	1.201±0.03 (138)	1.353±0.01 (769)	2.399±0.03 (296)
2012	**0.780±0.02 (296)**	**1.056±0.01 (552)**	**2.212±0.03 (200)**

Note: Within parenthesis is the number of observation.

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

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

Experimental Results:

Flock Statistics: The opening and closing balance of Marwari flock during the year ending March 2013 was 829 and 800 respectively (Table 1). Additions were due to lambing (389) and deductions were due to mortality (41), culling (326) and sale (51) to Government agencies/ NGO/ Farmers etc.
The overall mortality irrespective of age were 3.36 and 24.27 per cent respectively. Age group wise details of culling, mortality and overall percent are presented in Table 2. A total of 3 hogget males and 33 ewes were sold to state sheep breeding farm, Fathepur and for genetic improvement in the animals of farmers flock. The culling and mortality rates were 0.42, 11.29, 23.36 and 24.27 and 2.76, 1.61, 1.22 and 2.31% respectively in lambs, weaners, hoggets and adults, respectively.

Reproduction:
The reproductive performance of Marwari ewes during year 2009-12 has been presented in Table 3. The overall tupping and lambing on available and bred basis were 96.66, 90.57 and 93.75 % respectively during year 2012. The replacement rate was 29.97%.

Growth performance:
The data on growth performance of the lambs born during the year 2009 to 2013 were subjected to least squares analysis and results are presented in the Table 4. Overall least squares means for birth, 3, 6, 9 and 12-month body weight was 3.09, 15.41, 21.94, 25.85 and 29.89 kg respectively. The Corresponding values for the year 2012 were 3.41, 15.74, 22.01, 24.37 and 28.43 kg respectively. The least squares means of birth weight and weaning weight of lambs born during the year 2013 were 3.07 and 16.69 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 2009 to 2012 were 136, 69 and 39 g., respectively. Corresponding figures for the year 2012-13 were 136, 67 and 34 kg, respectively.

Greasy Fleece Yield:
Wool yield data form 2009-2012 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 2nd clip during 2012 clip were 777, 656, 1480, 511 and 603 g, respectively. Wool samples of lambs born during the year 2012 were analysed for various wool quality traits. The least squares means for fibre diameter, Medullation, staple length and crimp were 39.96, 59.04 %, 5.26cm and 0.70 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 = 1.26504*VIWT+0.70942*IClip.). Ranking of the selected rams was made based on their index score. Last year top 21 rams were selected for breeding. Five hogget males were sold.

Selection differential:
The selection differentials for 6 month weight and 1st six monthly GFY was 6.30 kg and 111 g respectively.

Table 1: Flock statistics for the year 2012-2013

Age group	Opening balance		Closing balance	
	Male	Female	Male	Female
0-3 Months	46	35	101	99
3-6 Months	63	54	-	-
6-12 Months	71	96	68	57
Adult	37	427	72	403
Total	**217**	**612**	**241**	**559**

Table 2: Annual survivability and culling 2012-2013

Age	Culling (%)			Mortality (%)			Culling & mortality (%)		
Group	M	F	Total	M	F	Total	M	F	Total
0-3M	0.39	0.46	0.42	3.52	1.86	2.76	3.92 (255)	2.32 (215)	3.19 (470)
3-6M	14.49	7.27	11.29	2.41	0.60	1.61	16.90 (207)	7.87 (165)	12.90 (372)
6-12M	26.55	20.24	23.36	1.65	0.80	1.22	28.21 (241)	21.05(247)	24.59 (488)
Adult	47.44	18.55	24.27	0.00	2.88	2.31	47.44 (137)	19.63 (555)	17.19 (692)

Table 3: Reproduction performance for the period from 2009 to 2012

Year	No. Available	No. Tupped	No. Lambed	Tupping (%)	Lambing % (available basis)	Lambing % (Tupped basis)
2009	381	379	335	99.47	87.92	88.39
2010	419	410	378	97.85	91.08	93.10
2011	320	309	302	96.56	94.37	97.73
2012	414	400	375	96.66	90.57	93.75

Table 4 : Growth performance of Marwari lambs for the year 2009 to 2012 (kg)

Effect/trait	Birth Wt.	3M Wt.	6M Wt.	12M Wt.
μ	3.09±0.01 (1784)	15.41±0.06 (1454)	21.94±0.09 (1287)	29.89±0.13 (659)
Year	**	**	**	**
2009	2.82±1.02 (354)	14.48±0.12 (336)	21.02±0.17 (323)	29.56±0.23 (180)
2010	3.00±0.01 (325)	12.87±0.13 (270)	19.91±0.19 (253)	31.53±0.37 (76)
2010-11	3.13±0.02 (415)	17.26±0.11 (383)	24.37±0.16 (339)	30.03±0.22 (212)
2011-12	3.41±0.03 (315)	15.74±0.13 (298)	22.01±0.19 (254)	28.43±0.23 (191)
2012-13	3.07±0.02 (375)	16.69±0.17 (167)	22.51±0.28 (118)	

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

Effect	Adult Clip			Lamb Clip	
	Spring	Autumn	Annual	First	Second
μ	752.47±5.25 (1949)	565.75±4.45 (1839)	1385.63±11.06 (1390)	510.56±4.62 (1286)	695.83±7.94 (499)
Year	**	**	**	**	**
2011	793.56±7.41 (454)	514.57±6.67 (421)	1353.08±13.52 (375)	613.01±8.26 (352)	730.75±15.44 (107)
2012	777.92±9.12 (340)	656.41±6.96 (409)	1480.53±14.36 (323)	511.91±10.2 (230)	603.07±12.37 (160)
2013	649.27±7.84 (420)			449.89±13.9 (124)	

Note : Within parenthesis is the number of observation.

2.3 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.

Experimental Results:

Progress of work

Flock Statistics:

The flock strength of Muzaffarnagari sheep for the year 2012-13 is presented in Table 1. The opening balance (01. 04. 2012) was 588 sheep while the closing (31. 03. 2013) was 550 sheep. The addition was due to birth of 263 lambs while the reduction was due to death (43), culling (87) and sale (149).

Culling and Mortality:

The overall culling in 0-3 month, 3-6month, 6-12 age group and adults it were 0.29, 5.32, 11.42 and 6.75%. The mortality was recorded to be 3.78, 4.79, 0.39 and 2.01% in the 0-3, 3-6, 6-12 age group and adults respectively. The overall culling and mortality was 10.22 and 5.05%. The overall culling on health ground was 0.59%.

Reproductive Performance:

The reproductive performances of ewes in the year 2012 are depicted in Table 3. The annual tupping, lambing on available basis and lambing on bred basis were 86.9, 74.3 and 86.7%. 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 30.4kg, 445 days, 595 days and 36.5kg, respectively.

Growth Performance:

The data on growth traits generated over the years (2009-2013) 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, 15.21, 22.72, 26.96 and 31.09 kg respectively. Corresponding values for the year 2012 were 3.75, 15.21, 23.59, 27.23 and 31.00 kg respectively. The overall average daily weight gain (2012) at pre-weaning (0-3 month) and post-weaning (3-6, 6-9, 6-12 month) were 127, 84, 41 and 51g respectively

Greasy Fleece Yield:

The least-squares means for fleece yield at different clips are presented in Table 8. The overall least squares means for lambs 1st and 2nd season clip and adult annual clip were 507.15, 548.91 and 1235.13 g, respectively. In year 2012, the means for lambs first, second and adult annual clips were 530.70, 567.62 and 1198.16 g, respectively.

Selection of Rams:

Selection of rams was done on the basis of 6-month body weight.

Selection Differential & Response to selection:

The selection differentials for 6-month body weight was 8.3 kg for year 2012-13. Details about response to selection was not given. The h^2 estimates of birth, 3, 6, 9, 12 month body weight and first six monthly clips were 0.075, 0.161, 0.225, 0.340, 0.274 and 0.388, respectively. A total of 149 elite germ plasm (58 rams and 91 ewes) were sold to Animal Husbandry Department, Uttar Pradesh and progressive farmers for genetic improvement of the breed under field conditions.

Table 1: Flock statistics

Age group	Opening balance as on 1.4.2012		Closing balance as on 31.3.2013	
	Male	Female	Male	Female
0-3 Months	38	43	46	34
3-6 Months	67	59	64	55
6-12 Months	18	17	05	07
Adult	48	298	70	269
Total	**171**	**417**	**185**	**365**

Table 2: Annual culling and mortality percentage

Age group	Culling (%)			Death (%)			Total (%)		
	M	F	Total	M	F	Total	M	F	Total
0 – 3M	0.53 (188)	0.00 (156)	0.29 (344)	3.72 (188)	3.85 (156)	3.78 (344)	4.25 (188)	3.85 (156)	4.07 (344)
3 – 6M	5.47 (201)	5.14 (175)	5.32 (376)	6.47 (201)	2.86 (175)	4.79 (376)	11.94 (201)	8.00 (175)	10.11 (376)
6–12M	9.92 (131)	13.00 (123)	11.42 (254)	0.00 (131)	0.81 (123)	0.39 (254)	9.92 (131)	13.82 (123)	11.81 (254)
Adult	9.93 (151)	5.54 (397)	6.75 (548)	1.32 (151)	2.27 (397)	2.01 (548)	11.26 (151)	7.81 (397)	8.76 (548)
Overall	12.46 (321)	8.46 (530)	10.22 (851)	6.85 (321)	3.96 (530)	5.05 (851)	19.31 (321)	12.83 (530)	15.27 (851)

* Culling on health ground = 0.59%

Table 3: Ewes reproductive performance

Lambing season	No. of ewes available for breeding	No. of ewes tupped	Tupping percentage	Number of Lambing	No. of live lambs born	Lambing percentage on the basis of	
						Ewes available	Ewes tupped
Season 1	202	169	83.7	142	167	75.1	91.0
Season 2	111	90	81.1	60	76	62.2	77.9
Annual	298	259	86.9	202	243	74.3	86.7

Replacement rate = 99*100/298 = 33.2%

Table 4: Growth performance

Particulars	Birth wt.	3M Wt.	6M Wt.	9M Wt.	12M Wt.
Overall mean	3.65±0.03 (691)	15.26±0.15 (577)	22.72±0.24 (434)	26.96±0.26 (407)	31.09±0.27 (370)
Year	NS	**	**	**	**
2010	3.53±0.05 (146)	13.65±0.29 (135)	21.14±0.38 (128)	25.71±0.39 (122)	30.90±0.42 (104)
2011	3.71±0.04 (265)	16.92±0.21 (261)	22.44±0.28 (224)	27.94±0.28 (237)	31.36±0.29 (222)
2012	3.75±0.05 (197)	15.21±0.25 **(**181**)**	23.59±0.55 **(**62**)**	27.23±0.63 **(**48**)**	31.00±0.64 **(**44**)**
2013	3.63±0.07 (83)	-	-	-	-

** Significant (P>0.01), Figures within brackets are number of observations.

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

Particulars	Lambs Clip		Adult annual
	First season	Second season	
Overall	507.15±07.55 (510)	548.91±09.01 (369)	1175.34±13.01 (668)
Year	**	NS	**
2010	492.19±14.59 (119)	501.16±15.80 (110)	1126.94±20.14 (241)
2011	498.58±14.35 (123)	577.94±19.20 (115)	1380.30±19.06 (261)
2012	530.70±09.72 (268)	567.62±10.05 (144)	1198.16±22.88 (208)

2.4 MPKV RAHURI (MAHHARASHTRA): DECCANI SHEEP FOR MUTTON- Farm Based

Project Title: Network Project on improvement of Deccani sheep for dual purpose.

Experimental results:

Flock Statistics:

The total population of the Deccani sheep in beginning and at the end of the year (2012-2013) was 574 and 606, respectively. Addition in the flock was due to lambing (220) and reductions were due to death (43), sold (7) and culling (163). Details of the population statistics are presented in Table 1. Ewe replacement rate is 22.61 per cent. Overall mortality and culling on health ground in the flock was 3.17 and 12.01 per cent. Mortality and culling on health ground during the period under report is depicted in Table 2.

Reproductive Performance:

Annual reproductive performance for the year 2012-13 (lambing) is presented in Table 3. Tupping percentage was 93.94. Lambing percentage based on ewes available was 83.02. The average age at first lambing and inter lambing period was observed to be 636.85 and 298.97 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 were 3.43, 15.67, 22.14, 23.61 and 256 kg, respectively. Efforts are required to be made to improve the body weight at nine and twelve month. There is no improvement in body weight at different ages over last five years.

Greasy Fleece yield:

The overall least squares means for lambs 1st and 2nd season clip and adult annual clip were 437, 478 and 528 g, respectively.

Selection of rams:

Preliminary selection of was done on the basis of body weight at six months. The selection differential for six monthly body weights was 3.26 kg.

Response to Selection:

Response to selection of the rams used during 2012-13 was observed to be positive for six months weight.

Sale of breeding stock:

During the year under report in about 7 rams were sold for breed improvement programme.

Table 1: Flock statistics

Age group	Opening balance 1.04.2012		Closing balance 31.03.2013	
	Male	Female	Male	Female
0-3 Months	46	28	30	36
3-6 Months	32	37	25	39
6-12 Months	27	26	21	26
Adult	64	314	104	325
Total	**169**	**405**	**180**	**426**

Table 2. Annual culling and death percentage for the year 2012-13

Age group	Culling percentage on Health ground			Death percentage			Overall percentage		
	M	F	Total	M	F	Total	M	F	Total
0-3 months	3.35 (149)	00.00 (145)	1.70 (294)	2.68 (149)	3.45 (145)	3.06 (294)	06.03 (149)	3.45 (145)	04.76 (294)
3-6 months	8.45 (142)	10.64 (141)	9.54 (283)	2.82 (142)	1.42 (141)	2.12 (283)	11.27 (142)	12.06 (141)	11.66 (283)
6-12 months	26.50 (128)	10.81 (111)	19.25 (239)	4.69 (128)	1.80 (111)	3.35 (239)	31.19 (128)	12.61 (111)	22.60 (239)
Adult	11.36 (132)	17.11 (409)	15.71 (541)	4.54 (132)	3.42 (409)	3.70 (541)	15.90 (132)	20.53 (409)	19.41 (541)
Total	11.98 (551)	12.03 (806)	12.01 (1357)	3.63 (551)	2.85 (806)	3.17 (1357)	15.61 (551)	14.88 (806)	15.18 (1357)
Up to 1 Year	12.17 (419)	6.80 (397)	9.56 (816)	3.34 (419)	2.27 (397)	2.81 (816)	15.51 (419)	09.07 (397)	12.37 (816)
Adult	11.98 (551)	12.03 (806)	12.01 (1357)	3.63 (551)	2.85 (806)	3.17 (1357)	15.61 (551)	14.88 (806)	15.18 (1357)

Note: 1) Fig in parenthesis are the number of sheep available during the year.
2) The culling percentage on health ground in flock was 12.01%
3) Overall mortality percentage in flock was 3.17%

Table 3: Reproduction performance

Traits	Year				
	2008-09	**2009-10**	**2010-11**	**2011-12**	**2012-13**
Tupping per cent	94.00 (235)	92.00 (190)	93.39 (245)	93.88 (278)	93.94 (265)
Lambing percentage - ewes available	88.00 (221)	88.88 (220)	90.45 (220)	84.17 (278)	83.02 (220)
Age at first lambing (days)	639.58±43.24 (25)	638.13±38.42 (25)	642.14±10.31 (28)	640.71±6.38 (44)	636.85±6.87 (36)
Inter-lambing period (days)	333.27±31.27 (147)	311.8±39.39 (145)	302.17 ± 07.42 (172)	305.08 ± 02.95 (187)	298.97±2.97 (184)
Twinning per cent	2.72	2.50	2.10	1.30	--

Note: Figures in parenthesis indicates number of observations.

Table 4: Growth performance of Deccani sheep (Least squares means)

Particulars	Body weight (in kg)				
	Birth	**3 Months**	**6 Months**	**9 Months**	**12 Months**
Overall mean	3.44±0.01 (1204)	15.66±0.09 (1048)	22.04±0.13 (858)	23.06±0.14 (672)	24.27±0.16 (554)
Year					
2007-08	3.39±0.03 (194)	15.46±0.19 (172)	22.06 ±0.25 (149)	23.48 ±0.23 (130)	24.70±0.29 (118)
2008-09	3.42±0.03 (200)	15.64±0.20 (158)	21.63 ±0.27 (140)	21.99 ±0.26 (101)	22.90±0.35 (80)
2009-10	3.51 ±0.03 (157)	15.81 ±0.21 (150)	22.30 ±0.29 (127)	23.32 ±0.26 (116)	24.20 ±0.34 (92)
2010-11	3.43±0.03 (202)	15.64±0.18 (194)	21.64±0.23 (180)	22.92±0.20 (163)	23.94±0.27 (139)
2011-12	3.43±0.02 (231)	15.67±0.16 (225)	22.14±0.21 (206)	23.61±0.20 (162)	25.60±0.27 (125)
2012-13	3.45±0.03 (220)	15.76±0.20 (149)	22.45±0.41 (56)	--	--

Note: Within parenthesis are the number of observations

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

Project Title: Network Project on Nellore sheep improvement.

Experimental Results:

Flock Statistics:

The opening and closing balance for the period under report was 673 and 682, respectively. Additions were due to lambing (278) and reductions were due to death (76), sale of breeding rams to farmers (93), emergency auction (22) and public auction (76) and missing (2). Ewes replacement rate was 27.52 per cent. The details of population statistics have been presented in the Table 1.

The overall mortality and culling percentage in 0-3 months, 3-6 months, 6-12 months and adult groups are 1.47, 3.38, 16.45 and 8.65 %, respectively (Table 2).

Reproduction:

The reproductive performance during the period under report is presented in Table 3. Overall tupping percentage was 88.11. During this year a total of 278 lambs were born. The overall lambing percentage was 80.57 % based on the breedable ewes available and 91.45 % based on the ewes tupped basis.

Growth Performance:

Results are presented in Table 4. Least squares mean (2011-12born) body weight at birth, weaning, six months, nine months and 12 months of age were 3.08, 10.42, 14.21, 20.32 and 25.57 kg, respectively. Least squares mean (2012-13 born) body weight at birth, weaning and six months were 3.15, 14.48 and 22.82 kg, respectively.

Selection of rams:

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

Selection Differential:

Selection differential of rams used during the year 2012-13 was 4.04 kg for three-month weight and 5.67 kg for six-month weight. Response to selection is not given.

Sale of breeding stock:

During the year under report in about 93 adults rams were sold to different farmers for breed improvement programme.

Table 1: Flock strength

Age group	Opening Balance		Closing Balance	
	Male	Female	Male	Female
0-3 Months	31	30	61	74
3-6 Months	48	48	63	76
6-12 Months	32	53	0	0
Adults	75	356	59	349
Total	**186**	**487**	**183**	**499**

Table 2 : Annual Culling and Death Percentage for the year 2011-2012

Age group	Culling % (Health Ground)			Death%			Overall%		
	Male	Female	Total	Male	Female	Total	Male	Female	Total
0-3 Months	0	0	0	2.51 (159)	0.55 (180)	1.47 (339)	2.51 (159)	0.55 (180)	1.47 (339)
3-6 Months	0	0	0	4.22 (142)	2.61 (153)	3.38 (295)	4.22 (142)	2.61 (153)	3.38 (295)
6-12 Months	1.90 (105)	0.79 (126)	1.29 (231)	7.61 (105)	21.42 (126)	15.15 (231)	9.52 (105)	22.22 (126)	16.45 (231)
Adult	3.52 (170)	4.84 (454)	4.48 (624)	2.94 (170)	4.62 (454)	4.16 (624)	6.47 (170)	9.47 (454)	8.65 (624)

Note: Within parenthesis are 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
Season I (Off season)	330	143	43.33	141	42.72	98.60
Season II (Main season)	204	161	78.92	137	67.15	85.09
Annual	**345**	**304**	**88.11**	**278**	**80.57**	**91.45**

Table 4: Least Squares Means of body weights

Effect	Birth Weight	Weaning Weight	6 Months Weight	9 Months Weight	Yearly Weights
Year Effect	**	**	**		
2009 - 10	2.95±0.031 (243)	11.92±0.19 (220)	15.56±0.26 (212)	18.52±0.32 (201)	23.11±0.32 (200)
2010- 11	3.2±0.03 (248)	14.03±0.17 (238)	18.56±0.23 (217)	23.23±0.31 (209)	24.43±0.32 (196)
2011-12	3.08±0.03 (292)	10.42±0.16 (259)	14.21±0.23 (226)	20.32±0.33 (190)	25.57±0.33 (188)
2012-13	**3.15±0.03 (278)**	**14.48±0.16 (267)**	**22.82±0.34 (134)**	-	-

Note: Within parenthesis are the number of observations

2.6 RAJUVAS, BIKANER (RAJASTHAN): MAGRA SHEEP FOR CARPET WOOL

Project Title: Evaluation and genetic improvement of Magra sheep for carpet wool production in farmers' flock.

Experimental Results:

As envisaged in the technical programme, four centres of project were established at Norangdesar, Gadhwala, Kilchu and Kodemdesar. The Kodemdesar centre was identified 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 Statistics:

The centre-wise flock statistics as on 31.03.2013 is given in Table 1. The opening and closing balance of Magra sheep at three centres during the year was 8126 and 10804. There were 3508 lambing. A total of 313 animals (2.89%) died. A total of 517 sheep were sold at different centres during the year 2012-13.

Health Control Programme and Disease Incidence:

The health control programme was taken up during the year 2012-13 as one of the major inputs in the form of deworming, control of ecto–parasites and vaccination against infectious disease like sheep pox and enterotoxaemia. The total number of cases handled as prophylactic measures for deworming, dipping/spraying and vaccination were 22402, 27042 and 8195, respectively. A total of 16509 cases were treated for various ailments at three centres. The frequency of alimentary tract disease were highest (35.70%). Followed by respiratory disorder (34.80%). A total of 313 animals died during the reporting year amounting to 2.89% mortality.

Reproduction:

Highest lambing percentage (82.83) was found during Season – II (July to December, 2012) at Norangdesar followed by Kilchu (80.37) and Gadhwala (79.67) centre (Table 8). The overall lambing percentage was 54.11 in the registered sheep flocks under the Unit. No twinning was reported at any of the centre during the year.

Growth Performance:

Overall least squares means for body weight at birth, six & 12 months and adult stage was observed as 2.95, 19.93, 27.10 and 38.75 kg, respectively. Body weight at 12 months age was found to be significantly affected by sire groups.

Greasy Fleece Yield:

Least- squares means for annual and six monthly greasy fleece weights are presented in Table 4. The results for wool production indicated that the greasy fleece weight was 1.058 kg at 6-months age. The overall annual wool yield was found to be 2.213 kg.. Wool quality parameters were not analysed.

Distribution of Rams:

A total of 39 rams were purchased and distributed to the registered breeders at Kilchu, Gadhwala and Norangdesar centres. The selection differential was 2.893kg for 12 months body weight and 0.239 kg for annual wool yield.

As per the decision taken during the last annual review meeting and recommendations of QRT, Magra field based unit was shifted from RAJUVAS, Bikaner to ARC, CSWRI, Bikaner with effective from 01.04.2013.

Table 1: Flock statistics

S.No.	Name of the centre	Age group	Opening Balance as on 1.4.2012		Closing balance as on 31.3.2013	
			Male	Female	Male	Female
1.	**Norangdesar**	Young	106	543	330	669
		Adult	109	1589	690	1470
2.	**Gadhawala**	Young	332	658	363	866
		Adult	313	1720	809	1945
3.	**Kilchu**	Young	239	664	395	1160
		Adult	179	1674	696	1411
Total		Young	667	1865	1088	2695
		Adult	601	4983	2195	4826
Overall			8126		10804	

Table 2: Reproductive performance for the year ending 31.03.2013

Centre	Lambing Season	Ewes available for breeding	Total Live Lambs born	Lambing (%)
Norangdesar	Season – I	2444	370	15.14
	Season- II	833	690	82.83
Gadhwala	Season - I	2143	378	17.64
	Season – II	1043	831	79.67
Kilchu	Season – I	2911	494	16.97
	Season – II	927	745	80.37
Overall			3508	54.11

Table 3: Growth performance

Particulars	Birth Weight (Kg.)	Six Months Weight (Kg.)	Twelve Months Weight (Kg.)
Overall	2.0958 ± 0.008 (3508)	19.93 ± 0.356 (3283)	27.10 ± 0.021 (3813)
Centres			
Norangdesar	2.997 ± 0.007 (1060)	20.076 ± 0.448 (1020)	25.424 ± 0.032 (999)
Gadhwala	2.842 ± 0.005 (1209)	20.273 ± 0.425 (1172)	27.004 ± 0.033 (1259)
Kilchu	3.037 ± 0.007 (1239)	19.450 ± 0.532 (1091)	27.856 ± 0.040 (1555)

Table 4: Least-squares means for greasy fleece weight

Particulars	Greasy Fleece Weight (kg)	
	Six monthly yield	Annual yield
Overall	1.058 ± 0.005 (4935)	2.213 ± 0.003
Sex		
Male	1.189 ± 0.005 (2051)	2.302 ± 0.005
Female	1.190 ± 0.003 (2884)	2.124 ± 0.004

2.7 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.

Experimental Results

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 : Rayamangalam, Sirukundram, Otteri, Sastrampakkam and Annoor
Centre II : Veerapuram, Mevaloorkuppam, Vayalur and Pazhaiyanur
Centre III : Kayarampedu, Ponmar and Maduraipakkam
Centre IV : Kondamangalam, Periyavaiyavur, Andavakkam and PGRIAS

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 (123 sheep farmers) under this scheme during the year 2012-13 was 8677, of which 3157 were young and 5520 were adult. The population of sheep were 2565, 1376, 2162 and 2574 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. The sheep were dewormed thrice with levamisole/ivermectin/oxyclosanide against helminths. The lambs were dipped periodically for external parasitic infestations. Drenching and dipping as preventive measures and clinical treatment was also provided. A total of 23202 vaccinations were given against PPR, Sheep Pox and Enterotoxemia. 14207 sheep were drenched for control of internal parasites. 12300 animals were detected for non specific diseases during the period. The incidence of alimentary system was higher when compared to respiratory, general systemic disease and skin/subcutaneous system infections.

Reproduction:

Centre wise & village wise reproductive performance for the year 2012-2013 is given in Table 2. A total of 3697 ewes were available during the year and gave birth to 3157 lambs. 85.39 per cent lambing was observed during the year.

Growth Performance:
Body weights at birth, three, six, nine and twelve months and are given Table 3. Overall mean of body weights for lambs born during 2011-12 for birth, weaning, six, nine and twelve months were 2.89, 11.54, 15.90, 19.42 and 23.09 kg, respectively. Body weights for the lambs born during the year 2012-13 for birth and weaning were 2.59 and 11.62 kg, respectively. Body weights for 6, 9 and 12 months are in process of recording. ADG of 0-3 months, 3-6 months, 6-9 months and 9-12 months were 96, 50, 39 and 41 gm, respectively for 2011-12 and pre-weaning ADG for year 2012-13 was 100 g.

Distribution of rams:
During 2012-13, a total of 105 rams were purchased and distributed to various centres. A total of 153 distributed rams were available with farmers and at Centre I, II, III and IV were 34, 48, 27 and 44 rams, respectively.

Selection Differential:
Not Given

Table 1: Flock statistics for the year 2012-13

Name of the Centre	Young	Adult	Total
I	937	1628	2565
II	491	885	1376
III	780	1382	2162
IV	949	1625	2574
Grand Total	3157	5520	8677

Table 2: Ewes reproductive performance for the year 2012-2013

Centre	Number of ewes available for breeding	Mean body wt. of ewes at breeding	No. of ewes lambed single	Total No. of live lambs born	No. of ewes lambed twins	Lambing %
I	1090	27.03 ± 1.77	937	937	-	85.96
II	593	27.15 ± 0.99	491	491	-	82.80
III	926	25.71 ± 1.46	780	780	2	84.23
IV	1088	28.32 ± 1.52	949	949	-	87.22
Overall	**3697**	**27.05 ± 1.39**	**3157**	**3157**	**-**	85.39

Table 3: Growth Performance (2008-2009 to 2012-2013)

Effects under study	Birth wt. (kg)	3 months wt. (Kg)	6 months wt. (kg)	9 months wt. (kg)	12 months wt. (kg)
2009-10	2.85 ± 0.005 (3068)	11.37 ± 0.014 (2954)	15.46 ± 0.10 (2396)	19.28 ± 0.016 (1450)	22.22 ± 0.065 (986)
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	2.586 ± 0.047 (550)	11.617 ± 0. 132 (872)	-	-	-

2.8 OUAT, BHUBANESWAR (ORISSA) : GANJAM UNIT FOR MUTTON

Project Title: Evaluation and genetic improvement of Ganjam sheep for mutton production in farmers flocks.

Experimental Results:

Altogether eight villages have been identified under three centres in Ganjam district. The details of centres with identified villages are given below:

Centre	Name of Centre	Village(s)
I	Kalikote	Purnachandrapur, Fasid, Gorapalli
II	Rambha	Minahipatna, Ramachandrapur, Gendapalli
III	Chatrapur:	Ghadghadapalli, Tellapalli, Sundarapalli,

Flock statistics:

The centre wise flock statistics for the year 2012-2013 is presented in Table 1. The opening balance was 8004 on 01.04.2012 and increased to 8158 on 31.03.2013. There were 3789 lambing. A total of 396 animals died.

Health Control Programme and Disease Incidence:

The health control programme was taken up during the year 2012-13 as one of the major inputs in the form of deworming, dipping and control of ectoparasites. Clinical treatment to sick animals was also provided. Deworming through drenching was carried out twice for all the registered flocks during the period. Ectoparasites were controlled by dipping. A total of 23907 drenching were done for control of internal parasites. 1854 sheep were protected against ectoparasites by dipping/dusting /spraying.

Reproduction:

Centre wise reproductive performance for the year ending 31.03.2013 is given in Table 2. Altogether 4624 ewes were available during the year and they gave birth to 3789 lambs. 81.94 per cent lambing was observed during the year.

Growth Performance:

Centre wise body weights at birth, three, six and twelve months are given Table 3. Overall mean of body weights for birth, weaning, six, nine and twelve months were 2.80, 11.78, 17.08, 21.68 and 24.74 kg during 2012-2013.

Distribution of rams:

During 2012-2013 ram were not distributed.

As per the decision taken during the last annual review meeting, Ganjam field based unit was discontinued with effective from 31.03.2013.

Table 1: Flock Statistics

Name of the Centre	Opening Balance (As on 01.04.2012)			Closing Balance (As on 31.3.2013)		
	Young	Adult	Total	Young	Adult	Total
I. Khallikote	1249	2037	3286(30)	1323	1895	3218(30)
II. Rambha	1123	1328	2451 (26)	1146	1669	2815(26)
III. Chatrapur	1008	1259	2267 (24)	1016	1109	2125(24)
Grand Total	**3380**	**4624**	**8004 (80)**	**3485**	**4673**	**8158(80)**

Figures in parenthesis indicate the number of breeders.

Table 2: Reproductive performance

Name of the Centre	Number of ewes available for breeding	Number of ewes lambed	Lambing % on the basis of ewes available
I. Khalikote	2037	1574	77.27
II. Rambha	1328	1148	86.45
III. Chatrapur	1259	1066	84.67
Overall	**4624**	**3789**	**81.94**

Table 3: Growth performance

Year	Birth Wt.	3M Wt.	6 M Wt.	9 M Wt.	12 M. Wt.
2010-11	2.734±0.010	11.880±0.031	16.982±0.042	21.454±0.058	24.604±0.082
2011-12	2.70±0.01 (812)	11.62±0.04 (797)	16.98±0.05 (786)	21.51±0.06 (664)	24.64±0.12 (460)
2012-13	**2.80±0.01 (779)**	**11.72±0.04 (764)**	**17.08±0.05 (753)**	**21.68±0.08 (631)**	**24.74±0.14 (440)**

2.9 MPKV RAHURI (MAHHARASHTRA): DECCANI SHEEP FOR MUTTON- Field Based

Project Title: Network Project on improvement of Deccani sheep for dual purpose

Experimental Results:

Flock statistics:
The centre wise flock statistics for the year 2012-2013 is presented in Table 1. The opening balance was 3117 on 01.04.2012 and increased to 3933 on 31.03.2013. There were 1569 lambing. A total of 235 animals died. A total of 1151 sheep were sold at different flocks during this year.

Baseline Survey:
Deccani sheep field based unit was started from September, 2009. During last annual review meeting it is recommended to do fresh base line survey. Flocks were surveyed and recorded the body weights (kg) at birth, 3, 6, 9 and 12 months of age and were reported as 3.29, 14.35, 21.00, 23.61 and 27.95, respectively. Basis of grouping the animals in to different age groups was not clearly mentioned.

Health Control Programme and Disease Incidence:
The health control programme was taken up during the year 2012-13 as one of the major inputs in the form of vaccination. deworming, dipping and control of ectoparasites. Clinical treatment to sick animals was also provided. A total of 6090 drenching were done for control of internal parasites. Vaccination was given to 4351 sheep against FMD, HS, BQ and PPR. In addition to prophylactic measures, 196 sheep were given curative treatment for non-specific diseases.

Reproduction:
The Reproduction performance of sheep under field condition for the year 2012-13 is given in Table 2. A total of 1694 ewes were available for breeding. Out of these sheep 1561 ewes were tupped and tupping was 92.14 percent. Lambing percent on ewes available basiswas 80.81 and ewes tupped basis was 94.55%.

Growth Performance:
Centre wise body weights at birth, three, six and twelve months are given Table 3. Overall least squares means of body weight of progeny performance were given for birth, six, nine and twelve month at 3.57, 15.54, 23.63, 25.27 and 29.99 kg, respectively.

Selection differential: Details not given.

Distribution of rams:
During 2012-2013 a total of 39 rams were selected, purchased and distributed to the breeders. 08 rams were distributed at Ambi centre and 17 rams were distributed in Panodi and 14 rams were distributed in Miri centres, respectively. At present 84 of ram available with breeders.

As per the decision taken during the last annual review meeting, Deccani field based unit was discontinued with effective from 31.03.2013.

Table 1: Flock Statistics

Name of the Centre	Opening Balance (As on 01.04.2012)			Closing Balance (As on 31.3.2013)		
	Young	Adult	Total	Young	Adult	Total
I. Ambi	373	1239	1612	537	1337	1874
II. Panodi	120	508	628	248	985	1233
III. Miri	218	659	877	191	635	826
Grand Total	**711**	**2406**	**3117**	**976**	**2957**	**3933**

Table 2: Reproductive performance

Name of the Centre	Number of ewes available for breeding	Number of ewes lambed	Lambing % on the basis of ewes available
I. Ambi	1200	1025	85.42
II. Panodi	494	344	69.64
Overall	**1694**	**1369**	**80.81**

Table 3: Growth performance of progenies born

Details	Birth Wt.	3M Wt.	6 M Wt.	9 M Wt.	12 M. Wt.
Overall mean	3.57 ± 0.24 (4189)	15.54 ± 0.32 (2692)	23.63 ± 0.27 (874)	25.27 ± 0.58 (379)	29.99 ± 0.39 (217)
Year					
2010-11	3.58^{a} ± 0.34 (700)	16.89^{a} ± 0.36 (416)	25.40^{a} ± 0.38 (334)	25.83^{b} ± 0.39 (148)	29.88 ± 0.48 (69)
2011-12	3.56^{a} ± 0.26 (1920)	15.31^{b} ± 0.25 (1603)	24.60^{b} ± 0.41 (429)	25.20^{b} ± 0.32 (213)	29.98 ± 0.42 (139)
2012-13	3.44^{b} ± 0.32 (1572)	15.32^{b} ± 0.28 (673)	22.57^{c} ± 0.35 (111)	26.76^{a} ± 0.53 (18)	30.34 ± 0.41 (09)

3. INFRASTRUCTURAL SETUP OF NWPSI UNITS

3.1 STAFF POSITION: The staff position is given as on 31.3.2013

3.1.1. Project Coordination Cell, CSWRI, Avikanagar :

Work is managed by internal arrangement (by staff of PC Cell/ AGB Division)

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

Dr. A. L. Arora
Incharge, Project Coordinator (Sheep Breeding) (up to 11.04.2012)

Dr. L. Leslie Leo Prince
Incharge, PC Cell (from 12.04.2012 & continuing)

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

3.1.2 Cooperating Units located at SAU's (as on 31.03.2013)

S. No		Number of Posts																	
	Unit	Rahauri (Farm Based)			Palamner			Kattupakkam			Bikaner			Bhubaneshwar			Rahauri (Field Based)		
	Name of Posts	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V	S	F	V
1.	Professor (AG&B)	1	1	-	1	1	-	1	1	-	1	1	-	1	1	-	1	1	-
2.	Assistant Professor / Farm Manager	1	1	-	1	1	-	1	1	-	1	1	-	1	-	1	1	1	-
3.	Technical Assistant / Livestock Assistant	1	1	-	1	-	1	1	-	1	1	1	-	1	1	-	1	-	1
4.	L.D.C	1	1	-	1	1	-	1	1	-	1	-	1	1	1	-	1	1	-
5.	RA / SRF (Temporary)	1	1	-	1	-	1	1	1	-	1	1	-	1	-	1	1	1	-
	Total	5	5	0	5	3	2	5	4	1	5	4	1	5	3	2	5	4	1

S = Sanctioned, F = Filled and V = Vacant.

3.2 Budgetary provision

3.2.1 Revised Allocation (as per RE) for the year 2012-13 (ICAR Share 75%)

(ICAR Share Only) **(Rs. in lakhs)**

Head	**PC Cell**, CSWRI	**Chokla**, CSWRI	**Marwari**, ARC, Bikaner	**Muzaffarnagri**, CIRG
1. Pay & allowance	**0.00**	0.00	0.00	0.00
2. TA	**1.00**	0.40	0.40	0.40
3. Recurring Conti.	**3.10**	16.30	16.00	14.00
5. Livestock	**0.00**	0.00	0.00	0.00
Total ICAR Share	**4.10**	**16.70**	**16.40**	**14.40**

(ICAR Share Only) **(Rs. in lakhs)**

Head	**Deccani Farm**, MPKV	**Nellore**, SVVU,	**Magra**, RAJUVAS	**Madras Red**, TANUVAS	**Ganjam**, OUAT	**Deccani Filed** MPKV	Overall Total
1. Pay & allowance	20.00	20.00	22.50	22.50	20.00	20.00	**125.00**
2. TA	0.50	0.50	0.60	0.60	0.60	0.60	**5.60**
3. Recurring Conti.	15.00	15.00	12.00	12.00	12.00	12.00	**127.40**
5. Livestock	2.25	2.25	3.00	4.00	6.00	4.50	**22.00**
Total ICAR Share	**37.75**	**37.75**	**38.10**	**39.10**	**38.60**	**37.10**	**280.00**

4. Action Taken Report (ATR) on the Recommendations made in the Annual Review Meeting (NWPSI) held on 2-3 January 2013 at Jaipur

General recommendations (NWPSI)	
Recommendations	**Action Taken**
1. Flock maintained under network project and flock reared under projects of University/ other projects should be kept separately. Separate staff, funds and performance records should be maintained. Booking of expenditure made on University flock under the budget of Network project is not allowed.	Recommendation Implemented. All P.Is of Units have been instructed accordingly and PIs assured that flocks under NWPSI will be maintained separately.
2. At present among the five sanctioned post, one post of "Assistant Professor/Farm Manager" being followed and this will be re-designated to post of "Assistant Professor".	Recommendation implemented. PIs were informed and "Assistant Professor". Necessary modification was made in EFC proposal of XII Plan
3. Uniform feeding practices as per the committee recommendations should be strictly followed at all the farm based units under NWPSI.	Recommendation implemented. PIs were informed accordingly.
4. Performance recording of progenies born from the rams sold by Farm Based Units should be done to record the actual genetic improvement in the farmers flock. .	Recommendation implemented. P.I.'s of Marwari, Muzzafarnagri, Nellore and Deccani Farm Units have been instructed accordingly and PIs assured that this activity will be undertaken and results will be presented in the next Annual Review Meeting
5. 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.	Recommendation implemented. Madras Red and Magra Field based Units were instructed to undertake semen quality and Brucella screening.
6. Field based unit under NWPSI should explore the possibilities of AI with freshly diluted liquid semen combined with estrus synchronization to accelerate superior germplasm dissemination. An initial pilot work may be initiated at one centre covering 1-2 flocks	Training on AI and Oestrus Synchronization for PI and staff involved in the Madras Red and Magra Field based Units were conducted at CSWRI, Avikanagar during 1-7th August, 2013. Pilot work on AI and oestrus synchronization in field flock will be undertaken soon.
Specific recommendations:	
Farm Based Units under NWPSI	
Chokla Unit:	
The shifting process should be expedited and all Chokla animals should be shifted to ARC, Bikaner as early as possible for effective propagation and dissemination of germplasm in native tract.	Recommendation implemented. During the period 22 rams and 170 ewes were shifted to ARC, Bikaner and remaining flock was shifted during May, 2013. Chokla unit was converted into CSWRI Institute research project from 01.04.2013.

Marwari Unit:	
Efforts should be made to improve Greasy Fleece Weight. Target of annual GFY needs revision.	Recommendation implemented. P.I. informed that all efforts are being made to improve the greasy fleece yield and to achieve the target. As per earlier recommendation, adult rams with higher wool yield were also purchased from the field and introduced in the flock to increase genetic variability and improve greasy fleece yield. A survey was also made in villages in Jodhpur district in March 2011 to identify the rams with higher wool yield and production status of animals in the field. The rams with higher wool yield (>2 Kg) are not available in field. So, the targets of annual may be revised and fixed as 1.50 kg.
Muzaffarnagari Unit:	
Ewes that produced twins / triplets and its progenies should be screened for prolific gene status (FecB and other prolificacy genes) at Molecular Genetics lab, CIRG	PI informed that analysis is in process at Molecular lab, CIRG and results will be presented during the review meeting. Results are still awaited.
Deccani Unit:	
1. The lower post weaning gain should be improved by appropriate management.	PI assured that uniform feeding practices will be followed and there is improved in the post weaning growth performance
2. Overall management and performance should be improved.	PI assured that all necessary steps will be taken to improve the overall management.
3. Recording of GFY should be continued.	Recommendation implemented and recorded of GFY is in progress.
4. There is no justification in continuation with the present performance and managemental conditions, therefore final decision was taken by the Council and it is decided by the Council to discontinue Deccani Farm Based Unit from 31st March, 2013.	Council decided to continue the Deccani Farm based unit during XII Plan. Deccani field based unit was discontinued from 31.03.2013.
Nellore Unit:	
1. The lower six month body weight should be improved by appropriate management	P.I. assured that proper care and improved management will be given to the weaners.
2. Overall performance should be improved.	P.I. assured that there will be improvement in growth performance compared to previous year.
Field Based Units under NWPSI	
Magra Unit:	
1. As per the QRT recommendations, the Magra Field Based Unit will be discontinued from RAJUVAS from 31st March, 2013 and will be shifted and continued at ARC, CSWRI, Bikaner from 1st April, 2013.	Recommendation implemented. Magra Unit was shifted from RAJUVAS to ARC, Bikaner from 01.04.2013.

2. New areas in the breeding tract of Magra should be covered and new centers needs to be introduced	Recommendation implemented. Survey and flock registration in new areas are undertaken by ARC, Bikaner.
3. Wool quality parameters should be given due consideration during selection of rams for distribution.	Recommendation implemented. PI assured that wool quality parameters were given due weightage during selection.
Madras Red Unit:	
1. Coverage area should be increased by addition of new villages under the project.	Recommendation implemented. Two new villages (Melur and Thenmelpakkam) were added
2. Field demonstration on advantages of supplementary feeding to harvest maximum slaughter weight maybe taken up at one or two flocks.	Recommendation implemented. Field demonstration on supplementary feeding of concentrate has been initiated at Madurapakkam village. Results will be presented during review meeting.
Ganjam Unit:	
1. Ganjam sheep field based unit will be discontinued from 31st March, 2013.	Ganjam unit was discontinued from 31.03.2013
Deccani Unit :	
1. Deccani Field Based sheep field based unit will be discontinued from 31st March, 2013	Deccani field based unit was discontinued from 31.03.2013

5. OBSERVATIONS OF PROJECT COORDINATOR

Marwari Unit:

Body weight at six and twelve month weight were satisfactory. Annual lambing of above 90% was achieved. Overall performance is satisfactory. Sale of breeding rams needs improvement.

Muzaffarnagari Unit:

Growth performance at six month and twelve month was satisfactory. Observed and Expected Response to selection need to be compared. Lambing performance needs improvement. Overall performance was satisfactory. 58 breeding rams were sold.

Deccani Unit:

Efforts are required to be made to improve the body weight at six months of age. Ewe replacement rate and sale of breeding rams needs improvement.

Nellore Unit:

Efforts are required to be made to improve the body weight at six and twelve months of age. Details about response to selection were not given. 93 breeding rams were sold.

Magra Unit:

Thirty nine rams were distributed and needs improvement. Identification of progenies and performance recording needs improvement. Unit shifted to ARC, CSWRI, Bikaner from 01.04.2013. Pilot trail on AI with liquid semen with oestrus synchronization needs to be started in farmers flock.

Madras Red Unit:

Overall performance was satisfactory. Activities related to health coverage were observed satisfactory. One hundred and five rams were distributed. Pilot trail on AI with liquid semen with oestrus synchronization needs to be started in farmers flock.

Chokla Unit, Ganjam Unit & Deccani Field Unit:

Discontinued from 31.03.2013.

NOTES

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