

## DAIRY CATTLE CROSSBREEDING- POLICY AND RESPONSIBILITY

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## POPULATION CENSUS OF PAKISTAN AND PUNJAB

### Pakistan

■ Total	29.6	Million
■ Foreign/Crossbreds	3.7	Million
■ Others	13.1	Million
■ Pure	43.3%	
■ Crossbred	12.5%	

### Punjab

■ Total	14.4	Millions
■ Foreign/Crossbreds	2.5	Millions
■ Others	7.1	Millions
■ Pure	33.4%	
■ Crossbred	17.4%	

(Livestock Census, 2006)

Pure population

25-30%

(Afazi and Naqvi, 2004)

## DIVISION WISE CATTLE POPULATION PUNJAB (MILLIONS)

	Total	F/Crossbred	Others
Rawalpindi	1.0	.05	0.5
Gujranwala	0.9	0.2	0.4
Lahore	0.8	0.2	0.4
Faisalabad	1.2	0.2	0.6
Sargodha	1.3	0.2	0.7
Multan	1.3	0.2	0.7
D.G.Khan	1.5	0.07	1.3
Bahawalpur	1.2	0.07	0.9
Total	9.2	1.2	5.5

(Livestock Census, 1996)

## MILK AND MEAT CONSUMPTION

■ Human consumption	36299 (000T)
■ Beef consumption	1655 (000T)
■ Per capita milk consumption	175.2 Kg
■ Per capita meat	20.5 Kg

Economic Survey 2009-10

## HISTORY OF DAIRY CATTLE CROSS BREEDING IN PUNJAB

- Out of thirteen cattle breeds only three are milch breeds. Others are kept for draught purpose or dual purpose.
- Dairy cattle crossbreeding project was initiated at LPRI, Bahadurnagar Under the supervision of PARC in 1973-74.
- The sole objective was to increase production potential of local cattle
- There were two components
  - a) At station (Bahadurnagar, Okara)
  - b) Out reach research in the field (District Sheikhpura)

## Breeds

Local: 404 Sahiwal cows at Bahadurnagar, Okara were inseminated during 1973-74

Exotics: Holstein Friesian and Jersey semen was imported from USA, Australia, West Germany and New Zealand

(Chaudhry et al. 1993)

## NUMBER OF FEMALES PRODUCED FOR VARIOUS GENETIC GROUPS DURING DIFFERENT YEARS

Genetic Group	Holstein Friesian X Sahiwal		Jersey X Sahiwal	
	Year Of Birth	No.	Year Of Birth	No.
F <sub>1</sub>	1974-75	109	1974-75	48
75%	1976-78	98	1976-77	19
62.5%	1978-81	22	1979	5
37.5%	1978-81	16	1979-82	11
25%	1977-79	48	1977-82	41
F <sub>2</sub>	1979-84	115	1978-83	23
F <sub>3</sub>	1982-87	90	-	-
F <sub>4</sub>	1985-87	12	-	-
Total	-	510	-	147

## TRAITS OF ECONOMIC IMPORTANCE STUDIED WERE

- Age and weight at maturity and at first calving in heifers was recorded.
- Weekly milk records for production performance at farms and at 28 days interval in field up to 112 days. Milk yield was estimated by factors developed by Khan and Ahmed, 1972.
- No milk record was rejected on the basis of shorter lactation or other reason.
- Monthly milk was collected for fat and SNF estimation up to 112 days of first lactation.
- Lab facility at Sheikhpura was not available, hence no analysis was made there
- Calves born were weighed and Skeletal Measurements were recorded the end of each month up to 15 months of age

## DATA ANALYSIS

- Two herds were defined, herd I comprised of data of PARC project and herd II included data on SRW and Sahiwal Crossbreds
- Analysis was made for weight traits and growth rates and milk yield
- Weight records at birth, 3, 6, 12, 24, 36 and 48 months were utilized
- The general linear model for weight traits included herd, year, month of birth, sex and breed group effects, certain restriction were also applied to this model
- Standard least squares procedures were used for production and reproduction data
- SAS data set was generalized as per Animal Model
- Professor Dr. R.E. McDowell from North Carolina State University Raleigh USA, performed analysis

## BODY WEIGHTS OF HF X SAHIWAL AND JERSEY X SAHIWAL MALE AND FEMALE CALVES

weight at	HF X Sahiwal		Jersey X Sahiwal	
	Male	Female	Male	Female
Birth	23.75±0.25	25.01±0.24	19.52±0.34	19.58±0.37
3 months	76.25±3.14	64.98±0.94	60.95±3.59	59.71±1.46
6 months	124.10±3.27	110.83±1.87	105.16±4.90	106.19±2.92
9 months	205.46±5.04	162.50±2.82	165.27±7.44	156.86±3.92
12 months	265.90±8.06	213.49±3.45	210.50±9.39	198.69±4.52
15 months	307.12±8.45	265.76±2.72	256.70±7.63	241.97±3.77
18 months	-	309.96±4.19	-	278.76±4.03
24 months	-	371.90±3.03	-	332.64±4.29

## FIRST LACTATION PERFORMANCE OF DAMS OF HOLSTEIN AND JERSEY CROSSBREDS

Breed	No.	Milk Yield (KG)	Lactation Length
Holstein	91	1578	282
Jersey	36	1347	250
Overall	127	1513	273

Chaudhry *et al.* 1993

## PRODUCTIVE AND REPRODUCTIVE PERFORMANCE OF HF X SAHIWAL CROSSBREDS

Genetic Group	305-days Yield	Total Yield	Lact. length	Maturity Age (days)	First Calving AGE (Days)
½ F <sub>1</sub>	2641	3166	313	437	778
½ F <sub>2</sub>	1898	2402	381	671	1018
75%	2166	2724	284	483	911
62.5%	1453	2304	249	491	963
37.5%	1357	-	214	749	1066
25%	1509	-	217	599	1108

**PRODUCTIVE AND REPRODUCTIVE  
PERFORMANCE OF JERSEY X SAHIWAL  
CROSSBREDS**

Genetic Group	305 days Yield	Lact. length	Maturity age (Days)	First Calving age (Days)
½ F <sub>1</sub>	2126	284	422	794
½ F <sub>2</sub>	1599	247	680	976
75%	1709	245	416	805
62.5%	1114	174	485	961
37.5%	1196	185	729	1012
25%	1166	217	612	1092

**PRODUCTIVE AND REPRODUCTIVE  
PERFORMANCE OF HF x NON-DESCRIPT**

Particulars	50%	75%	25%	62.5%	37.5%
No. of Lactation	5	1	1	1	1
Age at Maturity	457	670	717	634	684
Age At Ist Calving	888	995	1089	921	1103
Milk production	3377	2458	1491	3370	3116

**CONCLUSION**

- HF x Sahiwal produced 72% more milk of their dams
- Jersey x Sahiwal produced 73% more of their dams
- HF x ND produced 142% more of their dams
- McDowell (1972) reported on the basis of 48 herds from six countries that crossbreeds produced 220% more milk in the same herd as did native cattle.

**THEN WHAT?**

- There should be a breeding policy
- On the basis of national and international experience, the exotic level be maintained between 50-75%
- We have to establish a stable crossbreeding system
- Two strategies namely Grading up and continuous F<sub>1</sub> production could be opted

### GRADING UP 50-75%

- Non-descript cattle will be inseminated with HF and Jersey bull's semen for production of 50% bulls
- For production of 75% bulls F<sub>1</sub> female will be back crossed with exotic for production of 75% bulls
- The selected 50% and 75% bulls will be used on main population
- Exotic inheritance level will fluctuate between 50-75%

### CONTINUOUS F<sub>1</sub> PRODUCTION

- This is purely a commercial activity
- Bulls of exotic breeds are used on females of the local population to produce F<sub>1</sub>
- For the purpose a large local population have to be maintained for crossbreeding
- All the F<sub>1</sub> Females will become part of commercial herds/Corporate Farms

### BULL PRODUCTION

Nucleus herd will be maintained in the public sector

- Livestock Production Research Institute Bahadurnagar (Okara)
- Livestock Experiment Station Qadirabad District Sahiwal
- Livestock Experiment Station Rakh Dera Chal, Lahore
- University of Agriculture Faisalabad will serve as nucleus herd
- Registration of progressive crossbred herds
- Selected F<sub>1</sub> males will be kept at calf rearing center at Livestock Production Research Institute Bahadurnagar (Okara) for growth study
- After Final selection selected male calves will be shifted to SPU, Qadirabad District Sahiwal
- The Director LPRI Bahadurnagar Okara will be responsible for bull production

### SEMEN PRODUCTION

- Semen of 50% and 75% bulls will be collected and preserved at SPU, Qadirabad District Sahiwal.
- Semen will be distributed to nucleus herds, registered breeders and local population by DBI.

## IMPROVEMENT OF REPRODUCTIVE EFFICIENCY

- Emphasis is to reduce the incidence of repeat breeding, age at maturity and calving interval
- Record keeping on reproductive parameters should be initiated at the farm and in the field
- Through extension services technical know how on postpartum reproductive management should be given to the register farmers
- Extension campaign will be launched by the Director LPRI Bahadurnagar Okara for register breeders.
- Farmers training about the nutrient requirements of crossbred cattle and their management

## RESEARCH AND DEVELOPMENT

- Establishment of embryo collection, preservation and transfer facility at LPRI Bahadurnagar Okara
- Capacity building program of staff of LPRI Bahadurnagar Okara and field workers supposed to do embryo transfer
- Embryos from the elite cows will be collected and preserved
- Director LPRI Bahadurnagar Okara will be responsible for planning and establishment of embryo transfer technology laboratory

## CROSSBRED BREEDER'S ASSOCIATION

- Efforts will be made for the establishment crossbred Breeder's Association
- Association will work for the promotion of crossbreeding program
- Association will make arrangements to exchange knowledge and experience among crossbred breeders.
- Association will organize the cattle show and milk competitions for promotion and encouraging other farmers

### ACTION PLAN FOR DAIRY CATTLE CROSSBREEDING

Objectives	Strategy	Program	Target/Time Frame	Action By	Role of stakeholders
Improving Milk Production	Crossbreeding and Grading Up	1. Bucleus herds at LPRI, Bahadurnagar, LES, Qadirabad, Dera CHAHL and at UAF	1-Purchase of 100 non-descript cows in first year and 100 more in the second year. 2. Purchase of 10000 doses semen of Holstein Friesian and 5000 of Jersey for insemination of cows.	Director LPRI, Bahadurnagar, Okara	Purchase of Non-Descript cows, tagging/ branding, breeding, and management. Purchase of semen
		Registration of crossbred farms	Registration of 50 farms in the first year having in total 1000 cows in first year, 50 farms having 1000 cows in second year, making in total 2000 cows registered	DLPRI	Registration of farms, branding and breeding of cows.
		Milk Production Recording	Milk recording of 600 freshly calved cows at station and in the field in first year and 600 in the second year.	DLPRI	Production recording on weekly basis at stations and monthly basis in the field by field staff. Birth weight and growth traits recording. Monitoring and supervision of recording activities.
		Identification of elite cows and candidate male calves	Top 20 % of the registered cows recorded for milk yield will be declared as elite.	DLPRI	Data collection and computerization at farm and of field and data evaluation. Rearing male calves at CRCs.

		Establishing of Progeny Testing program in crossbreds	Initially 2200 cows will serve the purpose of base herd for progeny testing.	DLPRI MDF DBI	Planning and evaluation of PTP Shifting of selected candidate bulls to SPU. Mating of test bulls Semen collection, preservation. Collaboration with PTP.
		PTP continued	Performance recording of daughters	DLPRI	Production recording at station and in field of bull's daughters put under PTP. Ranking of bulls.
Improvement in reproductive efficiency	Reducing incidence of repeat breeding, Age at maturity and CI	Reproductive performance recording	Keeping record on reproductive traits at stations and in the field.	DLPRI	Staff at the stations and in field will collect information on reproductive traits.

Development	Maintenance of nucleus herd	Strengthening crossbred farms	Strengthening herds at LPRI, Qadirabad., Dera Chahl and UAF	DLPRI Director Dera Chahal Chairman ABG	Look after and supervision of breeding, selection of crossbred cattle
	Embryo transfer	Introduction of embryo transfer technique.	Establishment of embryo transfer lab LPRI, Bahadumagar, Okara. Capacity building of staff and imparting practical on hand training to staff.	DLPRI MDF	Planning and establishment of lab Training of staff and technical help in establishment of lab.
	Establishment of crossbred Breeders association	Organizing milk competitions and crossbred shows.	Making groups of progressive breeders. Bringing more farmers in milk recording net.	DLPRI Breeders association	Extension meetings with farmers Visits of farms of progressive breeders



### BEEF PRODUCTION BREEDING POLICY AND RESPONSIBILITY

- No beef breed is available as suck in Pakistan
- No defined system have been adopted for beef production
- Cattle and buffaloes are mainly kept for milk and draught purpose
- Main sources of beef are spent dairy and draught animals, and buffalo and cow male calves
- Fifty percent of the total beef coming from buffalo with out any planned effort
- Annual beef production is 1655 Thousand tons
- No concept of beef grades
- Poor and ill practiced market channel

## PAST INITIATIVES FOR ENHANCEMENT OF BEEF PRODUCTION

- Old Bullocks Fattening was done in sixties
- Buffalo Calf Fattening at LPRI for experimental purposes and in the field under various projects.
- Crossbreeding in 1969-1970 with Australian Droughtmaster at Sibi (Effort for development of Beef Breed)
- Crossbreeding with Charolais in 1978-79 at LPRI, Bahadurnagar, Okara
- Crossbreeding with Simmental in 1998 at LPRI, Bahadurnagar, Okara
- Extension in beef Crossbreeding program at LPRI, Bahadurnagar, Okara. More exotic breeds were involved namely Charolais, Hereford and Angus

## OUTCOME OF THESE INITIATIVES

- Narimaster was evolved as a synthetic beef breed at Sibi, however their performance was not very much impressive
- In Charolais crossbreds weight at birth, 12 and 15 months of age was 25.02, 324.47 and 335.62 kg
- The weight of buffalo calves at birth, 12 and 15 months was 32.8, 275.40 and 324.00 kg
- Dressing percentage in Charolais crossbreds was 57 %

## GROWTH PERFORMANCE OF BEEF CROSSBREDS AT BAHADURNAGAR

Parameter	Angus x ND	Hereford x ND	Charolais x ND	Simmental x ND	Non-descript
Birth wt. (Male)	31.50	32.84	32.95	32.15	20.10
Birth wt. (Female)	30.15	31.25	31.80	30.20	19.00
Weaning Wt. (Male)	205.10	210.50	225.50	212.00	120.60
Weaning Wt. (Female)	195.15	206.35	210.00	208.00	110.25
12 Month Wt. (male)	280	290	305	290	185.60
18 months weight (Male)	390	400	415	399	265

## WHAT SHOULD BE THE POLICY FOR IMPROVEMENT OF BEEF PRODUCTION

- **Cattle**
  - A) Crossbreeding**
    - 1- Grading up non-descripts to 50-75% exotic level with beef breeds
    - 2- Continuous F<sub>1</sub> Production- Mating non-descript with exotic. All produce will be slaughtered
    - 3- Three Breed Cross- Low grade dairy crosses will be mated with beef breed
  - B) Selective Breeding:**

The potential indigenous breeds (Dajal and Bhagnari) can be improved through selective breeding. Genetic control of growth traits is high. A quicker response is expected as a result of selection



## Buffaloes

- More than three million buffalo calves are available
- Feed lot fattening should be introduced
- The male calves at Govt. Farms not required for further breeding be put under feed lot fattening

Objective	Strategy	Program	Target/ Time frame	Action by	Role of Stake Holder
Beef Production	Grading up to 50-75 % local non-descript cows	50-75 % Bull Production  Extension in beef project at LPRI, Bahadurnagar	Purchase of 200 cows in two phases	DLPRI	Purchase of cows Purchase of exotic beef semen
	Continuous F <sub>1</sub> Production	Identification of non-descript cows in the field	Registration of 2000 cows in two phases	DLPRI	Insemination with exotic beef semen
	Three Breed Cross	Identification of low producer crossbred cows	Registration of 500 cows	DLPRI	Insemination with exotic beef semen

Objective	Strategy	Program	Target/ Time frame	Action by	Role of Stake Holder
Beef Production	Selective Breeding in Dajal and Bhagnari	Establishment of nucleus herds		DLF	Recording on weight and growth traits

Thanks