Educated Decisions for Dairy Cattle **Breeding in Pakistan**

M. Sajjad Khan

Cholsitan University of Veterinary and Animal Sciences Bahawalpur

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Animal breeding WIKIPEDIA

by humans. For breading of animals in the

Animal breeding is a branch of animal science that addresses the evaluation (using best linear unbiased prediction and other methods) of the genetic value (estimated breeding value, EBV) of livestock.

Textbook animal breeding Animal breeding and genetics for BSc students

entra for Genetic Resov enomics Group, Wager entrie, the Netherlands.

Animal breeding involves the selective breeding of domestic animals with the intention to improve desirable (and heritable) qualities in the next generation.

https://library.wur.nl/WebQuery/wurpubs/524548

+ * (form Material and the second second

Crossbreeding

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Definition

noun The act or process of producine offspring by mating purebred individuals of different breeds or varieties

Supplement

Crossbreeding is defined as the process or the act of producing offspring particularly through mating two purebred individuals but come from different breeds, varieties, or even species. When it is usually done with the intent of producing offspring that would acquire desired traits of the parent lineages the process is specifically referred to as designer crossbreeding. This is commonly

Cattle Breeding Options

- A. Within Breed Selection
- B. Breed Replacement
- C. Crossbreeding

Breeding by definition

the mating and production of offspring by animals. "the flooding of the rivers is a trigger for breeding to start

the good manners regarded as characteristic of the aristocracy and conferred by heredity.
 "that's the kind of modesty you get from good breeding"

Institute for Energy and Environmental Research For a safer, healthier environment and the democratization of science

ABOUTHER RENOUNCES PRODUCTS Basics of Nuclear Physics and Fission

A basic background in nuclear physics for those who want to start at: Some of the lemms used in this flectubeet can be found in IEER's or a

E. Fertile Materials

m-239 and ura m-233 in amounts useful for n is that occur in relative abund ergy p -239 is p st be manufactured from mat in reactions following the abs is that occur in relative automatic ion of a neutron by uranium-238; uranium 232 are called um-233 is prod tron absorption in thorium-232. Uranium-238 and the resolution of fissile materials from them is cal fied bre



Q s

and brending row desizable qualities. Hu unity has been modifying domesticated aals to better suit human needs for centuries. Se and we haded. The fundamental biological principles underlying an

Chapter 1: Introduction to animal breeding

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Animal breeding is aiming at the improvement of animals by changing their genetic abilities for important traits. These traits are determined by the requirements and wishes from the society which might change over time. Animal breeding is highly influenced by research and developments in population-, quantitative- and molecular genetics.



The practical application of genetic analysis for development of lines of domestic animals suited to human purposes.



Farm animal breeding is the activity in farm animal production providing the next generation of farm animals. Animal breeding ensures a continuous improvement of farm animals, generation after generation

Another sperm separation method is based on the self-propelled movement of sperm. In this techniques known as migration method sperm molity is an essential prerequisite. The most commonly used technique is the classical swime up migration method. This method Genetic improvement (animal breeding) is based on the principle that the products (milk, meat, wool, etc.) and services (e.g. transport, draught power or cultural services) provided by animals are a function of their genes and the provide up an influences that they are exposed to. Improvement an be achieved by selecting genetically superior animals to be the parents of the next generation. "Genetically superior" means superior in terms of a technique is the classical swim-up migration method. This method is particular set of characteristics, which usually include productivity in the environmental conditions expected in the future, but should also consider traits such as fertility, disease resistance or longevity that relate to costs of production.

technique is the classical swim-up migration method. This method is based in separation by using the active sperm movement from an injected sperm suspension below a medium during an incubation period, typically around one hour. In comparison to density gradient centrifugation methods, this technique provides lower recovery rates of motile spermatozoa due to the many layers of sperm in the lower levels of the pellet that may block the possibility of reaching the

Publiced en on method for preparation of sperm

Crossbreeding

- Crossbreeding is the mating of two individuals with different breed makeups
- Crossbreeding is one type of a larger class of mating systems called outbreeding. Outbreeding has the opposite effect of inbreeding and is defined as the mating of relatively unrelated individuals
- **Objectives** of Crossbreeding:
- combine all desirable characteristics of two or more breeds in one progeny type (complementarity) and

- (LBSA regulates semen usage) Registered population not very big (small holders) yet, these
- · Human resources to run such programs dwindling
- available in Punjab





USAID



Research Centre for Conservation of Indigenous Breeds Jhang

Progeny Testing Program



Progeny Testing Program





litre

Yield

vilk.



. 1900 1920 1940 1960 1980 2000 2020



- exploit the **hybrid vigor** or heterosis (i.e superiority in the performance of a crossbred individual above the average performance of the two parents

I. Within breed Selection

- Performance recording and progeny testing being executed for Sahiwal breed in Punjab only (SCBS owns the breed)
- Artificial Insemination practised yet, supply of good semen not sustainable, more modern technologies (ET/IVF) awaited
- compete with crossbreds as well as exotics,
- A Research Centre for Conservation of Indigenous Breeds



nondescript adjective

Save Word

non-de-script | 🐧 nån-di-'skript 🕥

- Definition of nondescript
- : belonging or appearing to belong to no particular class or kind : not e described II _____ a nondescript mixture of styles in the worst possible taste, ______ George Bernard Shaw
- 2 : lacking distinctive or interesting qualities : DULL, DRAB // Their performance was disapp ntingly nonde

3 C

ساہیوال سل

. . Nondescript Translation in Urdu

دشوار بو

hod the

Urdu Trans on, Definition and Meaning of English Word Nondescript. Nondescript translation in Urdu. You can find other words (we weigh Nondescript transitions in the second sec

مجهول، غیر معروف، نا مشخص، جس کی تعریف یا خصوصیات کی تعیین

Non-descripts issue

• Too many, burden on the economy?

• No one owns them, can be used and misused? Describing these locally adapted animals – not a priority area? Color of the animal is the most important single feature – these fit into breed definitions?

 Crossbreds are descripted or undescripted – not even an issue? • With poor farmers having no role in policy making, sector

development? No institution responsible for taking care of them?

• Breed

The breed concept originated in Europe during the 18[®] century. In the developed word, breeds are recognized as "intra-specific" groups that share certain characteristics that set them apart from other groups and there are formal organisations for each breed. In the developing world sations for each preed, in the developing world there are few formal organizations kut distinct strains or breeds have developed due to a combination of traditional breeding objectives and cultural or geographic separation. Populations for which the original owners have a name should be accorded breed identity.

Ilse Kohler-Rollefson. 2004. Farm Animal Genetic Resources – Safeguarding National Assets for Food Security and Trade. GTZ. http://www.gtz.de

Either a sub-specific group of domestic livestock with definable and identifiable external characteristics that enable it to be separated by visual appraisal from other similarly defined groups within the same species, a group for which geographical and/or cultural separation

from phenotypically separate groups has led to acceptance

of its separate identity.

(EAO 2007)

Describing

the Non-

descripts



12

NAME :	Rati	Rates is an engenerate point toreed of action feared in the anst Regardian. This level functions as a major hedfored sour- formation in this region. Rates armays are particularly inner constrainment which is filterant direct, which is also inner					
PLACE :	Bikaner, Haryana, Penjab, Rajasthan.	trust. The livening was of drivs level lines in the baset of The sciencing of Makers, transpacey of Japainee drives interview of Rath cupits and simulation have needed have interviews of Real Briefly, Thurparkar and Dialem kneets with a perpendie before distance the antimum and an analytic beauting the same method and the action of the second periods with same pair and the body, that actional having sampling limited on these pairs are store sets.					
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· · Darrin	Breeds of Cattle - Rath Cat	tle					
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Texas Longhorn

Having color description to include "all the roans, brindles, speckled patterns, linebacks, grullas, reds, yellows, oranges, browns, and blacks" [http://doublehelixranch.com/color.html]

"The colors were more varied than those of the rainbow. There were brindles; blues – mulberry blue, ring, streaked blue, speckled blue, grullas-so named because they had the hue of the sandhill crane, also called mouse-colored or slate duns, washed-out and lervey creams – all hues of "vellow" browns with bay points; blacks, solid and splotched with white, brown and red; whites both clearly bright and dirty speckled; many sabinas, red and white peppered; reds of all shades except the dark richness characteristic of the Hereford, pale reds being very common; paints of many combinations. The line along the back was common, as in the mustang breed. Coarse brown hairs around the ears were characteristic. The shadings and combination of colors were so various that no two were alike"





Feb, 2021 near Madrissa (Bahawalnagar)

Dec, 2020 near HeadFarid (RY Khan)



Feb. 2021 near Channan Pir (Bahawalpur)





Breed

/en.wikipedia.org/wiki/Milk

a group for which geographical and/or cultural separation from phenotypically separate groups has led to acceptance of its separate identity.



Improving the existing non-descripts

- Have unique genetic variations and are proposed to possess 'thermometer gene' that can help them withstand higher temperatures and therefore could help farmers cope with the temperatures and therefore could neip farmers cope with the effects of climate change in future. 2. Are more resistant to diseases such as mastitis, have better resistance against FMD and internal parasites. 3. The only option for exporting beef to gulf countries. 4. The Eid-4 Asha high-priced scarificial animals also come from these non-descripts both as purebred or crossed with Brahman

- or other heef breeds
- The A2A2 argument



Protein components of cow milk

Whey alpha beta gamma keppa



The A2A2 argument

Milk composition analysis, per 100 grams

Constituent	Unit	Cow	Goat	Sheep	Buffalo
Water	g	87.8	88.9	83.0	81.1
Protein	g	3.2	3.1	5.4	4.5
Fat	g	3.9	3.5	6.0	8.0
Lactose	g	4.8	4.4	5.1	4.9
Cholesterol	mg	14	10	11	8
Calcium	mg	120	100	170	195
Energy	kcal	66	60	95	110

March, 2021 near Chishtian (Bahawalnagar)

Either a sub-specific group of domestic livestock with definable and identifiable external characteristics that enable it to be separated by visual appraisal from other similarly defined groups within the same species, or

(FAO, 2007)







The A2 argument

Journal of Applied Genetics 48(3), 2007, pp. 189-198
Polymorphism of boyine beta-casein and its potential effect on human health
Starialaw Kaminaki, Arma Caalinaka, Elzbieta Kontyra
Address: 1 horizon in Norm mile are a common source of backtoring peptides. The peptides are nelssate by the digetion of or cases are defined to the source of the distribution of the born before assess variants. At and B, to the same of source in AD. In hydrogen of the burster AI of burster, and B, the source of the source
seems that the populations that consume milk containing high levels of beta-casein A2 have a lower incidence of
cardiovascular disease and type 1 diabetes. BCM-7 has also been suggested as a
possible cause of sudden infant death syndrome. In addition, neurological
disorders, such as autism and schizophrenia, seem to be associated with milk consumption and
a higher level of BCM-7. Therefore, careful attention should be paid to that protein polymorphism, and deeper research is needed to verify the range and nature of its interactions with the human gastrointestinal tract and whole organism.
Key words: beta-casein, beta-casemorphin 7, diabetes, ischaemic heart disease, polymorphism.
Consepondence: S. Kamineki, Department of Animal Genetics, University of Warmia and Macury, M. Oczapowskiego 5, 10-718 Okutyn, Poland, e-mail: stachnil@cwm.edu.pl

Allelic Frequency of Beta Casein Genotypes

A2 A1 and Oth



ano (1991) Mishra et al. (2009

Ee and Med





The A2 Milk and Ghee from Bos indicus cattle breeds

A 2 MILK 36 Gir • fssat And And Distances in Bal DESI GIR COW'S RAW MILK 6 3 2 (500 ML) 10/4



















II. Breed Replacement Option

- · Holsteins (and even crossbreds) are being imported regularly yet, low input system does not allow any major break through
- Semen import is regulated Punjab through a Breeding Act 2014 yet, anything can be imported (in provinces other than Punjab)
- Cow importation still lacks standard operating procedures (SOPs) · Initial failures of exotic cattle were reported in the 80s but
- Initial natives of exotic safe were reprinted in the out successful examples are available now a days
 Holstein x Gir and other crossbreds are also under discussion as a breed replacement option using IVF (availage supported area).
- (seminar expected soon)

Exotic Cattle and Semen Imported in Pakistan



AHC (2000)

Dairy Breeds used for Crossbreeding in Pakistan



Milk Production in US Cattle Breeds



ries.uscdcb.com/eval/sur

Fat Production in US Cattle Breeds



Adult Body Weight of Different Breeds



Body Weight of Holstein, Brown Swiss and Jersey Heifers



ries.uscdcb.com/eval/su

8000 1

Longevity Traits in Brown Swiss, Holstein and Jersey Breeds

Parameter	Jersey	Holstein	Brown Swiss
Age at first calf (months)	25.8	26.8	28.1
Lactations completed at 5 years of age	2.3	2.1	2.0
Months in milking herd at 5 years of age	24.4	22.7	21.5
Days in milk through 5 years of age	41%	39%	37%
Cows alive at 5 years of age	45%	38%	42%

che et al. (2006

TOTAL DEBLC MANCE INDEX* (TPI*)

	10	11	- 52	6.8	6.6	- 14	14	2.0	14	0.13	п	0.5	0.8
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Whiel													
	PTA PTA FES ENVI	P = PTA P F = PTA F = Food I C = Body	notiein At Ethcien Weight	n 1 Composi	# UV # DF 505	= PTA = PTA = Fert = STA = PTA	Product Covy Un Dairy Indi Dairy Fr Scinution	tive Life ability in som i Celt Si		PLUT UDC FLC DCE DSB	= PLAT = Udde = Feet 4 = PLAC = PLAC	pe Composi Legs Cor aughter S aughter S	te riposite Jalving Ease Allbirth
Weig	Azing of	Major C	atego	ies					1	1.5			

Production 465 (Fat, Protein, Body Weight Corp. Health & Fertility 28% (SC3, PL, UV, PL DCE and DSE) Conformation 26% (PTAT, UDC, FLC and Dairy Ferri)

Please wait for an upcoming workshop

Crossbreds at military Dairy farms

Trait	1 st lactation	Overall
305-d milk yield	1613±49 kg	1944±37 kg
Lactation length	240±6 days	255±3 days
Age at first calving	1300±6 days	
Calving interval	543±18 days	469±11 days
Observations	6234	5011

Hasssan (2012)

/ield

Milk

305-Day

Crossbreds around the world (54 data sets)



New Breed Development Option

Many countries have produced new breeds through crossbreeding including popular Sunandini and Frieswal



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litres	6000 -	$\langle \cdot \rangle$									
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		198	198	198	196	196	195	196	196	20	
					Ye	ar of Ca	living				

Purebred Holstein and Jersey Cattle at RIPAR (Pattoki)

pvj.com.pk/pdf-files/28_1/9-12.pdf http://www.pvj.com.pk/pdf-files/24_2/S8-61.pdf Bilal et al. (2008): Javed et al. (2004): Usman et al. (2012)

III. Crossbreeding option

Started in early 70's

- First experimentation was at:
 i. University of Agriculture Faisalabad (1973) using Holsteins and Jersey semen ii. Livestock Production Research Institute Bahadurnagar, Okara under L&DDD (1974) using Swedish Red & White semen
- Enhancing dairy production through exotic semen
 Improvement of low producer cattle in Punjab
 Productivity enhancement of non-descript cattle In Punjab
- Military farms previously using buffaloes, quickly adopted it yet later on it was more upgradation resulting into deteriorating productivity

305-day yield across genetic groups (MFs)



Performance of Holstein x Sahiwal at UAF herd



Breeds developed from Indigenous/Exotic cattle									
Breed	Indicus breed	Taurus breed	Place						
1. Aust. Friesian Sahiwal	Sahiwal 4/8	HF	Australia						
2. Australian Milking Zebu	Sahiwal/Red Sindhi 3/8	J	Australia						
3. Brownsind	Red Sindhi 3/8	BS	India						
4. Frieswal	Sahiwal 3/8	HF	India						
5. Jersind	Red Sindhi 7/8	J	India						
6. Jerthar	Tharparkar 4/8	J	India						
7. Jamica Hope	Sahiwal ~1/8	J / HF	Jamica						
8. Karan Swiss	Sahiwal/RedSindhi 3/8	BS	India						
9. Karan Fries	Tharparkar 4/8	HF	India						
10. Mafriwal	Sahiwal 2/8	HF	Malaysia						
11. Mpawapwa	Sahiwal 5/8	HF, EAZ	Tanzania						
12. Phule Triveni	Gir 2/8	HF, J	India						
13. Sunandini	Non-Descript 4/8	BS / HF	India						
14. Taurindicus	Sahiwal 2/8	HF	New Zealand						
15. Vriandvani	Hariana 2/8-4/8	HF/ J/ BS	India						

Purebred Holsteins at Quetta, Peshawar and Pattoki



🗖 Quetta 📕 Peshawar 🔳 Pattoki



FAO ANIMAL PRODUCTION AND HEALTH PAPER Crossbreeding bos indicus and bos taurus for milk production in the tropics



(m)

42.7 1770

32.1 2333

33.5 1901 296

32.6 2151 296 472

33.1 1266 236 406

29.8 2319 288

Yield (I)

270 482

292 479

464

421

427

Crossbreds at Qadirabad

F1

F2

Overall

Performance of crossbreds

Indicus	Taurus		Milk	LL	AFC	СІ	
breed	breed	Country	yield	(days)	(m)	(m)	Reference
Boran	HF	Ethiopia	1874	305	35.7	13.1	Gojam et al. (2017)
Boran	HF	Ethiopia	2204	326	-	-	Getahun et al. (2020)
Hariana	HF	India	1582	359	33.4	-	Dhara et al. (2006)
local	HF/J	Bangladesh	1092	266	37	21.7	Ali et al. (2000)
.ocal	HF	Sudan	1847	316	47.1	-	Elemam and Nekheila (2012)
.ocal	HF	Ethiopia	1407	275	-	-	Kumar et al. (2014)
Local	J	India	2141	337	-	-	Ratwan et al. (2016)
Local	HF/J	Ethiopia	1208	296	37.3	17.9	Bisrat and Nigussie (2016)
.ocal	J	India	2580	364	29.4	15.3	Vijayakumar et al. (2019)
Local	HF	Ethiopia	2913	248	37.5	12.4	Kidane et al. (2019)
Sahiwal	HF	Pakistan	2151	296	33	15.5	Ahmad (2001)
Sahiwal	J	Pakistan	1861	262	30	14.0	Ahmad (2001)
Sahiwal	HF	Pakistan	1633	240	42.6	18.1	Hassan et al. (2013)*
Zebu	HF	Ethiopia	2314	274	36.6	21.4	Belay et al. (2012)
* 1ª parity							

Sahiwal crossbreds with Holstein and Jersey

	25 90		2333		2319	
	20 80	47.2	15.7	1902		
(Bill	15				13.8	33.3
act.	1580					
thy in	1000					
192	1080					
ţ	5 0 ð					
Agel	0					
		Sahiwal	Holstein F1	Holstein F2	Jersey F1	Jersey F2

Sustainability scenario

- 1. Ensured political commitment (financial and other resources) 2. Higher nutrition demands and better health cover (against
- Higher nutrition demands and better health cover (against mastitis, FMD, protozoan diseases etc)
 Marketing of milk with caped milk prices especially in winter
 Maintenance of exotic level of inheritance (50-75%)
 Local semen
 Purebred Exotic Holstein

 - iii. Purebred Exotic Jersev

 - iv. Holstein 50%
 v. Jersey 50%
 vi. Holstein 75%
 - vii. Jersey 75%



 Started in 1984 involving 30,000 crossbred cows at 37 Military Farms Presently total Population 16874 Females including 1054 elite females Average 305-d lactation milk yield is 3542 kg with 4% fat



Jersey F1 F2 Overall 30.3 1861 262

Sahiwal

Holstein

Gene Actions

2.5

2

1.5

0.5 0

1

A1A1

Sunandini Cattle origin

Mature body weight Age at first calving
 First lactation milk yield
 Overall lactation yield
 Milk fat A1A2

1963 Indo-Swiss Project Kerala (ISPK) later named Kerala Livestock Development Board (KLDB)

= 350-400 kg

28-32 mc

= 2300-27 = 3200 kg = 4%

(22) ×

Genotypes

A2A2

of Kerala (140)

Stansfield (1991)

: Value

Phenotypic

Opting for Crossbreeding

- Opting for Crossbreeding

 Non-descript cattle should be converted to 'descripted cattle'
 and indigenous breeds should be improved through
 performance recording (and genomics)
 Breeds such as Cholistani need new definitions according to
 ground reality otherwise it can be depleted easily leaving no
 choice for keepers
 Crossbreed semen should be produced to maintain exotic level
 of inheritance at a desired level
 Mass level crossbreeding without sustainability options
 (development of new breeds) cannot be endorsed just for the
 sake of crossbreeding, 'migration method'
 Technical capacity of Holstein farmers need to be improved so
 that their choices are worth the money spent
 We must produce animal geneticists otherwise imposters will
 continue to flourish

If We Had Options!

- Production and propagation of gnomically selected Sahiwal and Cholistani bulls
 Genetic improvement of indigenous breeds using elite bulls and in-vitro fertilization technology
 Eradication of food and mouth disease from Pakistan to enhance livestock exports .





Lets take educated decisions

Thank You