*IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*
*e-ISSN: 2319-2380, p-ISSN: 2319-2372. Volume 15, Issue 10 Ser. I (October 2022), PP 34-38*
*www.iosrjournals.org*

# Estimation of repeatability for certain productive traits Milk yield and Fat yield in various grade of Jersey × Red Sindhi Crosses at SHUATS dairy farm, Prayagraj, Uttar Pradesh"

[1]Amit Kumar, [2]Ram Pal Singh, [3] Sarvjeet Herbert and [4]Rajan Singh
*[1]M.sc Student, Department of Animal Husbandry and Dairying Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India*
*[2]Assistant Professor, Department of Animal Husbandry and Dairying Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar pradesh, India*
*[3]Professor and Pro Vice-Chancellor (Planning, Monitoring and Development), Department of Animal Husbandry and Dairying Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh, India*
*[4]P.hD scholar Nagaland Central Agriculture University (SASRD) Campus Medziphema*
*Corresponding Authors: rajan.gayasingh@gmail.com*

***Abstract***
*Department of Animal Husbandry and Dairying, Sam Higginbottom University of Agriculture, Technology and Sciences was used to examine 65 entries from 1935 to 1975 65 entries were evaluated from a pedigree cum history sheet from department of animal husbandry and dairying under Sam Higginbottom University of Agriculture, Technology and Sciences. Skilled people raised and cared for the animals in identical feeding and management conditions. Milk yield (ML), Fat yield (FT), were the reproductive features investigated. The data revealed that the repeatability (r) with Standard Error (SE) for the Milk yield and Fat yield high repeatability (r = 0.78) for milk with Standard Error (SE = 0.15), fat yield (r=0.89, SE=0.14) respectively. The repeatability estimation of low for all of the performance different traits suggested that most of the observed variation in these traits was due to temporary genetics variance and environment condition culling cattle on the basis of early performance records would be of little value. Thus multiple records of cattle need to be considered while making culling decisions.*

***Key word****: Repeatability estimation, Crossbred, Milk yield, Fat yield, Correlation, Standard Error, Pedigree.*

---

Date of Submission: 03-10-2022 Date of Acceptance: 18-10-2022

---

## I. Introduction

Crossbreeding work was started in India as early as 1875, near Patna using Shorthorn bull on local cows and the "Taylor" breed of cattle was formed (Sinha, 1951). The average milk yield of 5-6 liters/day. These animals are black, grey or red in color. Crossbreeding work on more scientific lines was initiated between 1910 and 1932 at the Imperial Dairy Research Institute at Bangalore, Agricultural Institute at Pusha, Livestock Research Station at Hosur and Military Dairy Farms at Allahabad. At Allahabad Agricultural Institute during 1924-1934, the crossbreeding work was started using indigenous breeds like Sahiwal, Gir, Haryana, Kankrej and Red Sindhi cows with exotic breeds like Holstein Friesian, Jersey and Brown Swiss sires. Since 1934, the crossbreeding work was limited to Red Sindhi and Jersey having 3/8 to 5/8 Jersey inheritances and a new breed of cattle "Jersindh" was developed. At Bangluru, Tharparkar cows were crossed with Jersey bulls and a new breed of cattle "Jerthar" was developed.) was started at Kerala using Brown Swiss and Jersey (5/8) on local non-descript cows and a new breed of cattle "Sunandini" developed. Sunandini is a multipurpose breed in 1963, the bilateral project Indo-Swiss now named Kerala Livestock Development Board (KLDB for milk, draft and meat, this breed is now becoming exclusively a milch breed (Chacko, 1994). The overall lactation milk yield was 2435 kg in 280 days with 3.89 % fat. In 1963 at NDRI, Karnal crossbreeding of Sahiwal and Red Sindhi with Brown Swiss were initiated to evolve a new dairy breed. Brown Swiss breed famous for its high milk yield, the various crossbred groups were formed which had not shown significant heterosis for milk yield. All the various crossbred groups were merged and selective breeding was carried out. The Brown Swiss inheritance varied between 50-75 % and the rest from Sahiwal cattle, was the next best crossbred group (Thiagarajan, 2014). The creation of synthetic population following selection resulted into a new breed of cattle "Karan Swiss in 1980''.

The Karan Swiss breed is usually light gray to dark brown in color. In 1971 at NDRI, Karnal crossbreeding Holstein Friesian, Jersey and Brown Swiss sires' semen was used on Tharparkar cows. The Holstein Friesian inheritance varied between 50-62.5 % and the rest from Tharparkar was the next best crossbred group (Thiagarajan, 2014). The creation of synthetic population following selection resulted into a new breed of cattle "Karan Fries" The color of Karan Fries breeds predominantly of black patches and sometimes is completely dark with white patches on forehead and tail. The average 1st lactation milk yield was 3619 kg in 305 days. The average fat % ranged between 4.10 and 4.17 and SNF ranged between 8.58 and 8.75 %. The Project Directorate on Cattle (PDC), Meerut has developed National crossbred cattle "Frieswal" a Holstein Friesian - Sahiwal cattle cross, yielding 4000 kg of milk with 4% butter fat in a lactation of 300 days (Directory of Frieswal Bulls, 2011). The chief body color of Frieswal cattle was black and white. Mahatma Phule Krishi Vidyapeeth (MPKV), Rahuri of district Ahmednagar, Maharashtra has developed a triple crossbred cow breed named "Phule Triveni" giving milk yield of 3000 to 3500 Liter/lactation with 4% of fat. The new breed has been developed by crossing Holstein Friesian (50 per cent), Jersey (25 per cent) and Gir (25 per cent) breeds (Doiphode et al., 2008). The genetic constitution of "Vrindavani" cattle carries 50–75% inheritance from exotic cattle breeds concerning Holstein-Friesian, Jersey and Brown Swiss and 25–50% from indigenous Haryana breed. The Vrindavani cattle exhibit almost all possible coat colors in addition to roan, light-dark brown, black and white and brown and white. The Vrindavani cattle yield around 3,000 kg milk in 305 days of lactation with 4– 4.5% fat (DARE/ICAR, Annual Report, 2007-08).

Milk production in India during the period 1950-51 to 2018-19, has increased from 17 million tonnes to 187.7 million tonnes as compared to 165.4 million tonnes during 2016-17 recording a growth of 6.65 %. FAO reported 1.46% increase in world milk Production from 800.2 million tonnes in 2016 to 811.9(Estim) million tons in 2017. The per capita availability of milk in the country which was 130 gram per day during 1950-51 has increased to 374 gram per day in 2017-18 as against the world estimated average consumption of 294 grams per day during 2017. This resulted through crossing Indian descript and non-descript cattle with exotic dairy breeds primarily Holstein Friesian, Jersey and Brown Swiss breed. India possesses the largest cattle and buffalo population in the world but average milk production per cow or buffalo is very low in comparison with advanced countries. Low milk production in India is probably due to low genetic potential for milk production, poor nutrition, farm management, unfavorable agro climatic conditions, poor veterinary and extension services (Dhara *et al.*, 2006). The average daily milk yield for crossbred cattle is 7.1 kg per day, but still significantly lesser than the United Kingdom, United States and Israel are at 25.6, 32.8 and 38.6 kg per day, respectively. (Kapoor, 2014).

## II. Material and Methods

A total of 65 records were used in this study to explore repeatability for specific productive features such as Milk Yield and Fat Yield in various grades of Jersey× Red Sindhi hybrids. Data for the current study project was gathered from the SHUATS Department of Animal Husbandry and Dairying's history sheet. The repeatability values were estimation by using restricted maximum likelihood procedure as outline by Patterson and Thomson (1971) fitting an individual's animal model. The data regarding productive traits were recorded and analyzed by intra class correlation method (R.A. Fisher 1921). The standard error of repeatability will calculate as per Swiger *et al.,* (1964).

$$Ykm = \mu + bK + ekm$$

Where,

Ykm is the Mth measurement on Kth individuals

μ is the common mean

bk is the effect of Kth individuals

ekm is environmental deviation of the Mth measurement of Kth individual.

The various fixed effects observed to be significant source of variation for different performance trades were fitted in the above mixed model for the estimation of repeatability. These included years of calving, lactation number lactation length for 305 days and lactation number of lactation length, Year of calving for Milk Yield year and Fat Yield.

## III. Result and Discussion

There are many economics characters of farm animals which occur more than once in the lifetime of an animal and take different phenotypic values at different times. Such characters are Milk yield and Fat yield and another productive trait in dairy animals. All these characters have different values for some animal measured at different time. Phenotypic value of quantitative characters is the joint product of phenotype and the environment to which the animal is exposed. The genotype of an animal is any living begins the decided and fixed at the time of conception and does not change throw-out the life of the animal except for mutation and errors in mitosis.

**Table No. 1** Repeatability estimates for various performance of productive triads of Jersey×Red Sindhi crosses.

| Traits | Number of records | Number of animals | $Cr^2_p$ | Repeatability (r) | Stander (SE) |
|---|---|---|---|---|---|
| Total lactation Milk yield 1/2J×1/2RS crosses | 48 | 16 | | 0.40 | 0.05 |
| Total lactation Milk yield 1/4J×3/4RS crosses | 69 | 23 | | 0.64 | 0.15 |
| Total lactation Milk yield 3/8J×5/8RS crosses | 21 | 07 | | 0.18 | 0.15 |
| Total lactation Milk yield 1/8J×7/8RS crosses | 42 | 14 | | 0.47 | 0.08 |
| Total lactation Fat yield 1/2J×1/2RS crosses | 48 | 16 | | 0.54 | 0.11 |
| Total lactation Fat yield 1/4J×3/4RS crosses | 69 | 23 | | 0.61 | 0.11 |
| Total lactation Fat yield 3/8J×5/8RS crosses | 27 | 09 | | 0.58 | 0.15 |
| Total lactation Fat yield 1/8J×7/8RS crosses | 51 | 17 | | 0.59 | 0.14 |

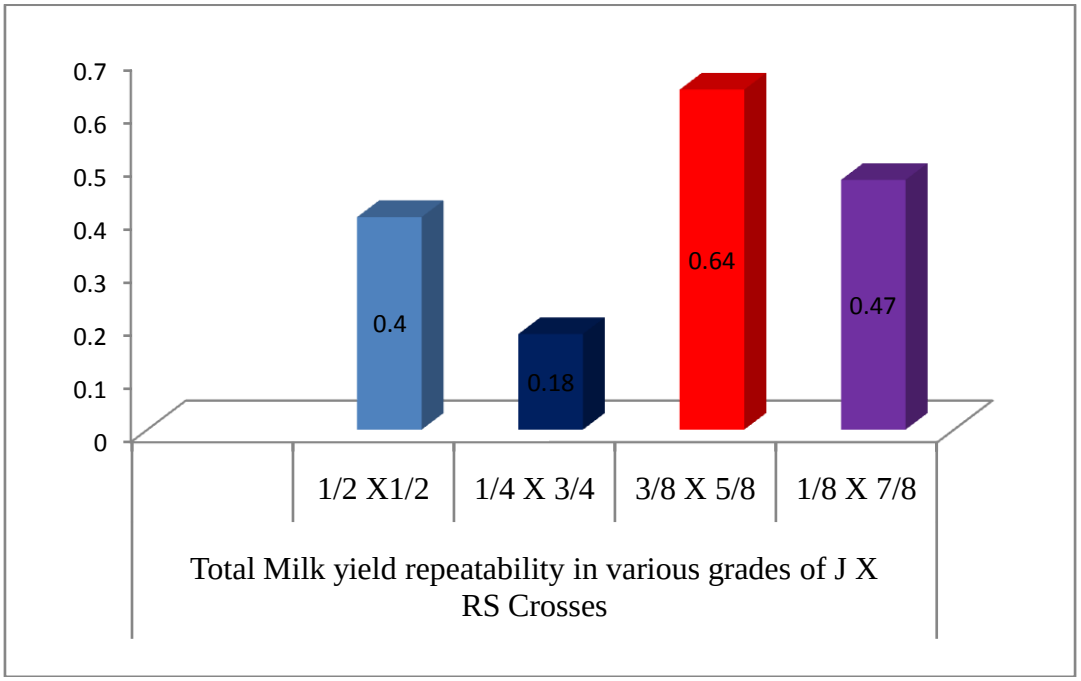


**Figure No. 1:** -repeatability of milk yield (kg) in 1st, 2nd and 3rd lactations of 1/2J 1/2RS, 1/4J 3/4RS, 3/8J 5/8RS, 1/8J 7/8RS crosses.

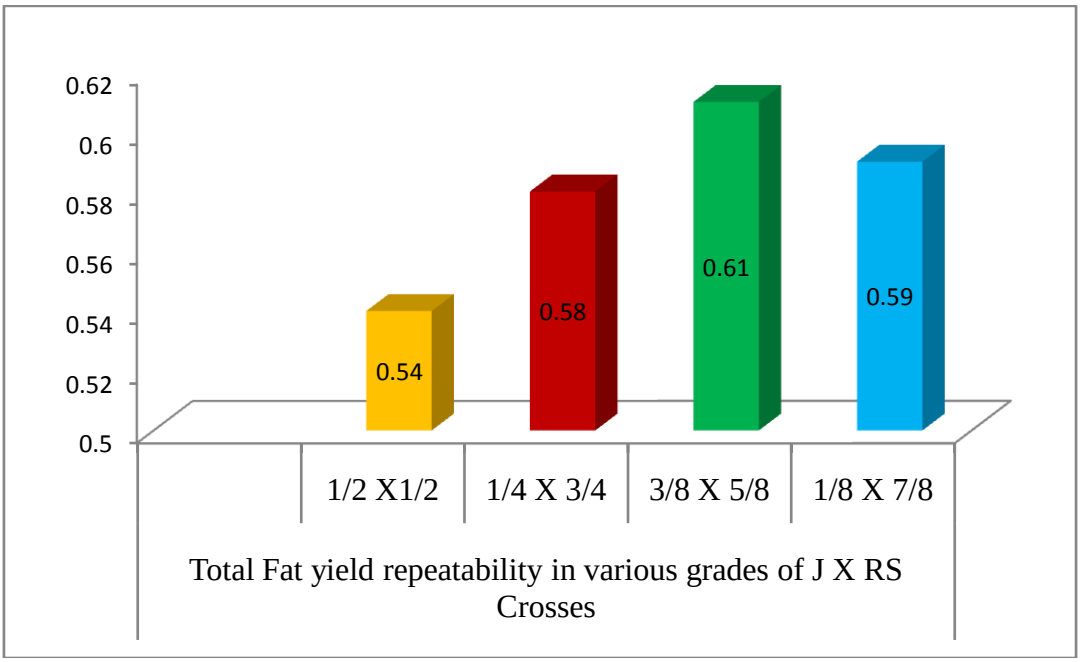


**Figure: - 2** repeatability of fat yield (kg) in 1st, 2nd and 3rd lactations of 1/2J 1/2RS, 1/4J 3/4RS, 3/8J 5/8RS, 1/8J 7/8RS crosses.

**Milk yield**

The repeatability estimation with stander error for milk yield based on ½ J x ½ RS 48 milk yield records of 16 cattle were 0.40±0.05,1/4 J×3/4 RS 69 milk yield of 23 cattle were 0.64±0.15, 3/8 R × 5/8 RS 27 milk yield of 9 cattle were 0.18±0.15 and 1/8 R × 7/8 RS 51 milk yield of 17 cattle were 0.47±0.08 (Table 1) respectively. The heritability of age at milk yield obtained for Jersey × Red Sindhi were 0.64±0.15 and this was estimation of moderate repeatability than the values reported by Okara *et al*. (1990) and Hadge M.R, Kuralkar but lower than that of Okara and Singh. The overall lifetime production performance of the Jersey x Red Sindhi crossbred cows of the herd studied were abysmally lower than the available reports for Jersey crossbreds in the tropics (Okara *et al.* (1990), Okara *et al.* (1990) Hadge and M.R, Kuralkar (2012), Hadge M.R, Kuralkar (2012).

**Fat yield**

The repeatability estimation with stander error for fat yield was found to be ½ J× ½ RS 48 fat yield record of 17 cattle were 0.40±0.17, ¼ J × ¾ RS 69 fat yield record of 23 cattle were 0.76±0.11, 3/8 J × 5/8 RS 27 fat yield record of 9 cattle were 0.30±0.2 and 1/8 J × 7/8 RS 51 fat yield record of 17 cattle were 0.51±0.12 respectively. Chaudhri and Sinha *et al.* (1984) reported a higher estimation of repeatability (0.50), Lincoln *et al.* (1965), Chaudhri and Sinha *et al.* (1984), Chaudhri and Sinha *et al.* (1984), Lincoln *et al.* (1965).

## IV. Conclusion

The repeatability coefficient for all the traits were analyses and concluded that the traits having moderate to high repeatability performed better in production perspective. The high repeatability for milk yield were recorded in 3/8 J 5/8 RS crosses, for fat yield in 1/8 J 7/8 RS crosses, were found best compared to crosses. Repeatability estimation as low as obtained in the present study indicated that culling Jersey×Red Sindhi crosess on the basis of early records for productive traits performance would be of low value. This study indicated to selection of Jersey×Red Sindhi Crosess.

## Acknowledgement

The authors duly acknowledge the Animal Husbandry and Dairy Department, Sam Higginbottom University of Agricultural Technology & Sciences for helping us and aiding us in the financial support for the experiment. The authors convey their gratitude to the professors and farm in-charge for the success of this experiment.

## References

[1]. Annual Report. 2008-09, 2010-11. Project Directorate on Cattle, Meerut, India.2009-10.
[2]. Annual Report. 2012 Basic Animal Husbandry Statistics. Department of animal Husbandry, Dairying & Fisheries Ministry of Agriculture, *Government of India*, New Delhi, India. P52-53.
[3]. Assefa A., and Hailu A., 2018. Ethiopian indigenous cattle breed's diversity, distribution, purpose of keeping, and their potential threats. *J. Bio. Inno* 6(12):1959–1968.
[4]. B. Shubha Lakshmi, B. Ramesh Gupta1, K. Sudhakar2, M. Gnana Prakash and Lt. Col. Susheel Sharma Department of Animal Genetics and Breeding College of *Veterinary Science*s, Rajendranagar, Hyderabad 500 030, India, **5** (4) 143-148.
[5]. Banda, J.W. 1996 Evaluation of the productive and reproductive performance of Friesian x Zebu and Jersey x Zebu crossbred cattle at Bunda College farm in Malawi. *Malawi J. Sci. Technol.*, **3**: 25-35.
[6]. Butte, S.V. and Deshpande, K.S. 1986 Calving interval in Friesian x Sahiwal crossbreds. *Indian J. Anim. Sci.*, **56**(7): 809-810.
[7]. Chaudhary, R.S. 1983 Study on inheritance of economics characters and genetic divergence in dairy Cows. M. Sc. (Ag.) Thesis, G. B. Pant University of Agriculture and Technology, Pantnager, Uttarakhand, India, **8**(9): 1032-1037.
[8]. Chaudhuri 1951 Sinha, C. Bihar Vet. Coll., Patna. *Indian Journal of Veterinary Science*, **21** pp.69-79.
[9]. Cheiron 1990 Department of Animal Genetics, Madras Veterinary College, Madras 600 007, India, Vol.**19** No.3 pp.131-138 ref.10.
[10]. Demeke, S., Neser, F.W.C. and Schoeman, S.J. 2004 Estimates of genetic parameters for Boran, Friesian and crosses of Friesian and Jersey with the Boran cattle in the tropical highlands of Ethiopia: Reproduction traits. *J. Anim. Breed. Genet.* **121**: 57-65.
[11]. Deokar, D. K. and Ulmek, B. R. 1995. Milk production efficiency traits in Jersey cattle. *Indian Journal of Dairy Science* **48**: 482–483.
[12]. Dubey, P.P. and Singh, C.V. 2005 Estimates of genetic and phenotypic parameters considering first lactation performance traits in Sahiwal cattle and crossbred cattle. *Indian J. Anim*, Vol.**4** (8), pp. 143-148...
[13]. H.T., Millen, D.D. and Fonseca, R. 2015 Estimates of genetic parameters for reproductive traits in Brahman cattle breed. *J. Anim*, **11**(9), 2509.
[14]. Hadge, M.R., Kuralkar, S.V., Ali, S.Z., Kharkar K.P. and Sawaimul, A.D. 2012 Genetic studies on productive traits of Sahiwal and Sahiwal X Jersey crossbred cows. *Indian J. Anim. Res.*, **46**(1): 92-94.
[15]. Haider 1984 Mohammad Zaman ; Farooq, M. A. ; Shah, S. K. Livestock Production Research Institute, Bahadurnagar, Okara, Pakistan Journal of Agricultural Research 1984 VOL.**4**_No.6_ 1988..
[16]. Haque, M.N., Haque, M.R., Parvin, A. and Hussain, M.M. 2011 Productive and reproductive performance of different crossbred cattle at Sylhet Govt. Dairy Farm. *Prog. Agric.*, **22**(1 & 2): 47-54.
[17]. Hassan, F. and Khan, M.S. 2013 Performance of crossbred dairy cattle at military dairy farms in Pakistan. *J. Anim Plant Sci.*, **23**(3): 705-714.
[18]. Indian J. Anim Dandapat, A., Banerjee, D. and Chakraborty, D. 2010 Genetic studies on various production and reproduction traits of Sahiwal and crossbred cattle (HF ×Jersey × Sahiwal) of an organized farm. *Vet. World*, **3**(4): 167-168.

[19]. J. Bio. Inno. Akhtar, M., Javed, K., Jarral, Z.A. and Khan, S.A. 2008 Environmental factors affecting performance traits of crossbred and local dairy cows at Mirpur Azad Jammu and Kashmir. *Pak. J. Agric. Res.*, **45**(2): 362-371.
[20]. Kabir, F. and Islam, M.R. 2009 Comparative study on productive and reproductive performance of local and different crossbred dairy cows at Daulatpur, Khulna in Bangladesh. *Bangladesh Res. Publ. J.*, **3**(2): 909-914.
[21]. Khan, S.A. 2007 Central Ground Water Board Ministry of Water Resources Government of *India North Western Region Chandigarh*, India.
[22]. Khanna, A.S. and Singh, K. 2003 Association between lactation traits and there MPPA for cows' evaluation *Indian J. Anim. Sci.* Volume: **73** (5): 818-819.
[23]. Kumar, D.K., Reddy, C.E., Gupta, B.R. and Satyanarayana, A. 2003 Effect of year, season and lactation order on the performance of Ongole cattle. *Indian J. Anim. Sci.*, **73**(11): 1289- 1290.
[24]. Maurya, P.R. and Saraswat, B.L. 2008 Performance of Jersey x Gangatiri crossbred cows over different lactation. *J. Agric. Res.*, **8**(2): 37-39.
[25]. Mishra, A.K. 2012 Current and emerging reproductive biotechnology for enhancing milk productivity, Problems and Prospect. Deptt. of Gynecology and Obstetrics, *College of Vet. And Animal Sci.*, GBPUAT, *Pantnager, Uttarakhand, India* Vol.**14**, No.2, 45-48.
[26]. Mukherjee, S. 2005 Genetic evaluation of Frieswal cattle. Ph.D. Thesis, National Dairy Research Institute (Deemed University) *Karnal, Haryana*, India. , **8**(8): 1032-1037.
[27]. Nayak, S.K. and Raheja, K.L. 1996 Performance of half-bred and 3-bred crosses of Hariana with exotic dairy breeds. *Indian J. Anim. Sci.*, **66**(2): 154-158.
[28]. Okara (1990) Environmental factors affecting milk yield in Friesian Cows in Punjab,Pakistan January 2004 *Pakistan Veterinary Journal, Vet. J.*, **24**(2): 2004.
[29]. R. Bajwa, M. S. Khan, (1998) Environmental factors affecting milk yield and lactation length in Sahiwal cattle M. A. Khan1 and K. Z. Gondal2 Livestock Production Research institute, Bahadarnagar, Okara, -38040, Pakistan, **24**(1):23-27.
[30]. S.R. Garudkar (2018) Studies on Persistency of Milk Yield and Its Association with Production Traits in Phule Triveni Synthetic Cow S.T. Pachpute and D.K. Deokar Department of Animal Science and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri, India, 2319- 7692 Special Issue**-6** pp. 1585-1589
[31]. Silva 1992 H.M, Wilcox C.J, Thatcher W.W, Becker R.B, Morse D. J. Dairy Sci. S.R. Garudkar S.T. Pachpute and D.K. Deokar Department of Animal Science and Dairy Science, Mahatma Phule Krishi Vidyapeeth, Rahuri, India. *Morse D. J. Dairy Sci*, Volume **100**, Issue 4, Pages 3166-3181.
[32]. Subramanian, 1990 A. Department of Animal Genetics, Madras Veterinary College Madras 600 007, *India Cheiron*. Vol. **37**, No. 1&2...

Amit Kumar, et. al. "Estimation of repeatability for certain productive traits Milk yield and Fat yield in various grade of Jersey × Red Sindhi Crosses at SHUATS dairy farm, Prayagraj, Uttar Pradesh." *IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS)*, 15(10), 2022, pp. 34-38.