# STUDIES ON THE IMPROVEMENT IN QUALITY BY CROSS BREEDING OF RAMBOUILLET SHEEP BREED WITH INDIGENOUS KAGHANI SHEEP BREED

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## Introduction

Pakistan imports [1] 1.14 million lbs. to over 20 million pounds of raw wool each year in the form of tops for consumption in the woollen and worsted mills of the country for production of fine quality woollen and worsted yarn and fabrics. This is because the major portion of the raw wool produced within the country is a carpet wool [2] which could not be utilised for the above purpose. In order to reduce this unfavourable drain on the foreign exchange, importations of foreign fine wool breeds for cross breeding with indigenous breed have been made, resulting in an upgrading process.

In Kaghan valley and certain other places in West Pakistan which have suitable climatic and pasture conditions, cross breeding [3] of Rambouillet breed (an imported breed) with indigenous Kaghani sheep has been in progress since 1958, resulting in an improved variety of breed. The process of cross breeding has been carried out in three successive stages named as F1, F2 and F3 during the past eight years. The present study deals with the improvements, by cross breeding, in spinning quality of the successive cross breed wool. For this purpose 40 wool samples each of the original Rambouillet, indigenous Kaghani sheep and the resultant cross breeds F1, F2 and F3 have been collected from Jaba Sheep Farm, Hazara. Studies have been made on each of the 180 staples taken at random from Rambouillet, indigenous Kaghani, F1, F2 and F3 breeds. Length, crimps per inch and diameter measurements of each of 180 staples of each breed have been made to study the improvements in spinning quality of the successive breed.

## Experimental

1. *Length Measurements.*—The length of the individual staples were measured by stretching it, so that the crimps or waves are removed. Ordinary scale was applied for this purpose. Twenty to twenty-five fibres were measured from each staple.

2. *Crimps Measurements.*—The crimps were measured by actually counting the number or waves over the whole length (unstretched) of the staples (180 staples from each breed). Crimps per inch were then calculated.

3. *Diameter Measurements.*—The staples after finding the crimps per inch were treated with benzene and thereafter with ether, to remove dirts and other impurities. The staples were cut into small pieces and the slide was made and thereafter the diameter was measured by projecting the slide on the lanameter with × 500 magnification. Twenty to twenty-five readings were taken for each staple.

## Results and Discussion

For producing different kinds [4] of woollen and worsted yarns and to get the desired effects in finished products, wool of an even character and a specified degree of fineness or grade is required. It is obvious that a fine light-weight fabric could not be produced from a coarse wool, nor would a fine wool be used to produce a rough cloth. When a large number of staples *i.e.*, 180 each from indigenous Kaghani, Rambouillet, F1, F2 and F3 were examined for length, crimps per inch and diameter, the following results were established:

1. In case of Rambouillet greater number of staples have been detected in the diameter range of 16μ—21μ, whereas lesser number of staples lies in the range of 24μ—27μ. Number of crimps/inch increases as the diameter decreases. The average number of crimps per inch is 9.

2. In indigenous Kaghani breed, greater number of staples lies in the diameter range of 30-41μ and the lesser number of staples is found in the range of 40μ to 47μ. Here we again see that number of crimps per inch increases with the decrease in diameter and the average value of crimps/inch is 2.

3. In case of F1, the greater number of staples lies in the diameter range of 24μ—27μ. Average value of crimps/inch in this case is zero and number of crimps/inch, as in the above cases, increases as diameter decreases.

4. In F2 breed, the greater number of staples is again in the diameter range of 24-27μ. Crimps/inch increase with the decrease in diameter and the average value of crimps/inch is 4.

5. In F3 breed, greater number of staples lies in the diameter range of 21μ—24μ. Average value of crimps/inch is 9 and crimps/inch increase as the diameter decreases.

The above study reveals that the crimps/inch in each successive crossing, *i.e.*, F1, F2 and F3 increases as the diameter decreases showing an improvement in the spinning quality. In F1 the number of crimps/inch is negligible and in the final crossing F3, the number of crimps/inch is maximum *i.e.*, 9 crimps/ inch.

Comparison of qualities, crimps/inch, diameter of Rambouillet, indigenous Kaghani, F1, F2 and F3 with American and English wool grades has been made. Leaving the Rambouillet breed aside it has been observed that in indigenous Kaghani wool number of crimps/inch ranges from 1 to 5 with a diameter range of 34.1μ to 38.0μ which could be assessed in quality range of $28^s$-$50^s$ of English and "low" quality of American grade.

In F1, which is first crossing between Rambouillet and Kaghani breed, the average number of crimps/inch is zero while the diameter ranges from 26.8μ to 27.2μ. This could be assessed in $28^s$ to $36^s$ quality of English and in "Braid" quality of American grade.

In F2 breed crimps/inch have increased from F1 and it is now 2 to 7 crimps/inch with diameter range of 25.6μ to 26.3μ. This could be assessed in $40^s$ to $56^s$ quality of English and "Braid" to "low" quality of American grade.

In F3 breed crimps/inch have increased from F2 and it is now 2 to 14 with the diameter range of 22.5μ to 25.5μ. This could be assessed in $46^s$ to $62^s$ quality of English and "common" to "fine" of American grade.

From the above results it has been established that by cross-breeding, the number of crimps/ inch is successively increasing and the diameter is decreasing. F3 breed has maximum number of crimps (9 per inch) with the minimum value of mean diameter of 23.0μ resulting in an improvement in the spinning quality. The quality has now reached $62^s$ of the English grade, while the imported Rambouillet breed's quality is $64^s$. Therefore, it will be quite useful if one more crossing is made. The resultant breed, *i.e.*, F4, will have more crimps/inch and finer diameter than F3 and the quality will still be nearer to that of Rambouillet.

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# BOOK NOTICES

**Methods in Microanalysis, Volume II.** Wet Combustion and Catalytic Methods in Microanalysis. Edited by J.A. Kuck. 400 pp. Gordon and Breach Science Publishers, 150 Fifth Avenue, New York, N.Y., 10011, 1965.

Volume II of the series METHODS IN MICROANALYSIS presents further essential material on the subject of organic microanalysis consisting of selected translations of significant articles that have appeared in recent Russian and Czechoslovak research journals.

Special attention has been given to the work of Alexander P. Terent'ev of Moscow University who has developed a successful technique of wet combustion for the analysis of refractory substances such as organometallic polymers and compounds with various N, P and Si combinations. Twelve papers are devoted to this work alone; they contain some excellent practical analytical chemistry. The book includes other contributions by Professor Tarent'ev and his co-workers; viz., the practical substitution of magnesium, calcium, or magnesium nitride for the traditional