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PERFORMANCE EVALUATION OF ALPACA AND LLAMA FIBER USING TWO TESTER INSTRUMENTS

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The luxury fiber quality is determined by several major characteristics, such as the average fiber diameter (AFD), standard deviation of the AFD (SD), and the comfort factor (CF). These quality characteristics determine the fiber use and trade values, which are as fiber animal selection factors. Therefore, performing an accurate and precision measure of these characteristics are critical in all stages of wool production and processing. However, most of existing fiber instruments were designed and developed for sheep wool test purposes, it seems justifiable to conduct a test performance validation for alpaca and llama fibers comparing OFDA2000 and MINIFIBER EC. Therefore, this study work was conducted for comparing three type of camelid fibers and two instruments (OFDA and MINIFIBER EC). Two hundred ultrafine alpaca fleece samples from a camelid ranch in US, one hundred and ninety three Peruvian alpaca fleece samples and ninety nine Peruvian llama fleece samples were obtained for this study. Each sample was split into two subsamples, one for measurement with OFDA2000 and the other for MINIFIBER EC, which was further split into two test specimen and used for repeatability and variance components estimates. Additionally, regression and correlation analysis of difference versus averages (DVA in short) between instruments, according recommendation of IWTO [1] were conducted. Statistical procedures of R 3.5.2. and Excel software were used. Linear model was used to evaluate effect of instruments OFDA and MINIFIBER EC. Descriptive statistics were used to characterize and define relationship between features of three types of fibers evaluated with OFDA and MINIFIBER EC. The AFD (mean±standard error) were found for 16.08±0.12, 21.11±0.23 and 22.46±0.35 and the difference of AFD values assessed with OFDA2000 and MINIFIBER EC were of -0.43, -0.24 and 0.44 μm for ultrafine alpaca and Peruvian alpaca fiber, and Peruvian alpacas and llama fiber respectively. In all cases, it these differences were statistically significant. The Pearson correlations ranged among 0.88 and 0.96, and the regression coefficients were closer to one (Table 1). At DVA analysis it found significant differences for alpacas but not for llamas fiber, although the regression and correlation values were low (0.14, 0.67 and -0.0.6 about regression, and 0.28, 0.19 and -0.15 about correlation, for ultrafine alpacas, Peruvian alpacas and llamas, respectively). The repeatability was 0.99 and values of variance components of repetitions were lower to 0.41%. At evaluation of comfort factor, the results are similar. Accordingly, the high coefficient correlations and repeatability, low differences and coefficient regression closer to one, which demonstrates that MINIFIBER EC instrument achieves AFD values similar to that of OFDA2000. Therefore, the MINIFIBER EC maybe be considered as an alternative test instrument suitable on farm use, such as animal selection, breeding value ranking and fiber classing in field for camelid fiber.



Table 1. Observations, statistics, and measurements found for alpaca and llama fiber by MINIFIBER and OFDA2000.

Statistics	MINIFIBER EC	OFDA2000	Difference (P- O)	Average
Superfine alpaca fiber	200	200	200	200
Number of observations	200	200	200	200
Average	15.86	16.29	-0.43	16.08
Standard deviation	3.74	1.91	0.92	1.73
Standard error	0.12	0.14	0.06	0.12
Significance level			***	
Peruvian alpaca fibers				
Number of observations	190	190	190	190
Average	20.99	21.23	-0.24	21.11
Standard deviation	3.18	3.35	0.92	3.23
Standard error	0.23	0.24	0.23	0.23
Significance level			N.S.	
Peruvian llama fibers				
Number of observations	91	91	91	91
Average	22.24	22.68	0.44	22.46
Standard deviation	3.52	3.31	1.40	3.35
Standard error	0.35	0.37	0.15	0.35
Significance level			***	

[1] International Wool Textile Organisation, IWTO-0 – Appendix B. 2017. Presentation of Supporting Technical Data. In: IWTO Red Book Specifications. Edition: 2017. Brussels, 19 p.