# SILK, MOHAIR, CASHMERE AND OTHER LUXURY FIBRES

EDITED BY ROBERT R FRANCK



The Textile Institute



WOODHEAD PUBLISHING LIMITED

# Silk, mohair, cashmere and other luxury fibres

Edited by Robert R Franck





CRC Press
Boca Raton Boston New York Washington, DC

WOODHEAD PUBLISHING LIMITED

Cambridge England

Published by Woodhead Publishing Limited in association with The Textile Institute
Woodhead Publishing Ltd
Abington Hall, Abington
Cambridge CB1 6AH, England
www.woodhead-publishing.com

Published in North and South America by CRC Press LLC 2000 Corporate Blvd, NW Boca Raton FL 33431, USA

First published 2001, Woodhead Publishing Ltd and CRC Press LLC © 2001, Woodhead Publishing Ltd
The authors have asserted their moral rights.

This book contains information obtained from authentic and highly regarded sources. Reprinted material is quoted with permission, and sources are indicated. Reasonable efforts have been made to publish reliable data and information, but the authors and the publishers cannot assume responsibility for the validity of all materials. Neither the authors nor the publishers, nor anyone else associated with this publication, shall be liable for any loss, damage or liability directly or indirectly caused or alleged to be caused by this book.

Neither this book nor any part may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, microfilming and recording, or by any information storage or retrieval system, without permission in writing from the publishers.

The consent of Woodhead Publishing and CRC Press does not extend to copying for general distribution, for promotion, for creating new works, or for resale. Specific permission must be obtained in writing from Woodhead Publishing or CRC Press for such copying.

Trademark notice: Product or corporate names may be trademarks or registered trademarks, and are used only for identification and explanation, without intent to infringe.

British Library Cataloguing in Publication Data A catalogue record for this book is available from the British Library.

Library of Congress Cataloging in Publication Data A catalog record for this book is available from the Library of Congress.

Woodhead Publishing ISBN 1 85573 540 7 CRC Press ISBN 0-8493-1311-2 CRC Press order number: WP1311

Cover design by The ColourStudio Typeset by Best-set Typesetter Ltd., Hong Kong Printed by T J International, Cornwall, England

### Contributors

Editor: Mr R Franck

3 Garden Road

Bromley

Kent BR1 3LU

UK

Tel: 0208 402 0307 Fax: 0208 402 0308

e-mail: robertr.franck@aol.com

### Chapter 1 Silk

Mr Ronald Currie

Former Secretary General International Silk Association

34 rue de la Charité

69002 Lyon

France

Tel: 0033 478 42 10 79 Fax: 0033 478 37 56 72

e-mail: Isa-silk.ais-soie@wanadoo.fr

### Chapter 2 Mohair

Dr Lawrance Hunter and Mrs E L Hunter

CSIR Division of Manufacturing and Materials Technology

PO Box 1124

Port Elizabeth 6000

South Africa

Tel: 027 41 5832131 Fax: 027 41 5832325

e-mail: lhunter@csir.co.za

### viii Contributors

Chapter 3 Cashmere, camelhair and other hair fibres

Mrs J Dalton

The Homestead Farm Bakestonedale Road

Pott Shrigley

Macclesfield

Cheshire SK 10 5RU

UK

Tel: 0162 5572 381

and

Mr R Franck (as above)

When The Textile Institute and Woodhead Publishing Limited decided to produce a book on luxury textile fibres, we immediately came across the problem of which fibres to include. What makes a fibre luxurious – its softness, its rarity and therefore its price, its 'image' (no doubt a consequence of the previous two factors)? If this is so, then why did we not include Sea Island cotton and flax? There was no good reason on the basis of image or for the other reasons mentioned. It really came down to the fact that, in the series of books on various textile fibres of which the present one forms a part, cotton and the other vegetable fibres will each have their own coverage, and we believe that it would be more appropriate to include Sea Island cotton and flax in these.

None of the fibres covered in this book are produced in large quantities. Even silk, with an annual production of approximately 70 000 tonnes, is not a major fibre. The total annual production of all the luxury fibres discussed in this book, of the order of 100 000 tonnes, is negligible in comparison with the world's total textile fibre production of 50 000 000 tonnes. Their production and harvesting are difficult and labour intensive, they often come from remote areas of the world where access and transport are difficult, and their prices are high to very high. Nonetheless, their fineness, softness, warmth and pleasurable handle have secured them a firm place in the niche areas of luxury apparel and furnishing fabrics. Were these fibres to disappear, many thousands of people in developing countries would suffer from a loss of an income which, if small by developed country standards, contributes in an appreciable way to their financial security.

As the quantities produced are so limited, the prices of all these luxury fibres can be subject to wide fluctuations. A sudden drop in demand from a major market or a diminution in production for one reason or another can lead to prices increasing or decreasing by 50 % or more in a period of a few weeks. It is striking that certain general basic marketing concepts emerge, and when these are ignored problems arise.

One of these basic concepts is to match, as far as is possible, supply and demand. Concerning demand, basic statistical techniques exist which

permit the forecasting of demand over a period of two to three years with considerable accuracy and these are used by the synthetic fibre industry and their raw material suppliers as a matter of routine, so why not for silk and luxury hair fibres. Regarding supply, the problem is more difficult because in the case of silk and luxury hair fibres this depends on the number of animals in existence and this cannot be rapidly increased or decreased. However the knowledge of future demand would enable the trade associations concerned to pass on this information to producers who would then, over time, be able to adjust their own activities to suit their individual interests. At the moment all, in this respect, are operating in the dark!

Being expensive, the fibres necessarily have a market which is limited to wealthy consumers who buy luxury goods not only for their intrinsic qualities of appearance, softness, warmth, handle and comfort but also simply because they *are* rare and expensive. It is the sum of such objective and perceived qualities which creates the image of the clothing and furnishing fabrics made from luxury fibres and which persuades the consumer to spend considerable sums of money in their purchase. In this respect, a cashmere garment is the textile equivalent of a Rolls Royce, a diamond necklace or a holiday home in the Caribbean! However, such status carries an inherent risk for goods of this kind because if, for any reason, their image is lowered, perhaps because of a genuine decrease in quality or of over-supply causing a drop in price, their attraction for wealthy consumers will fall and they will spend their disposable dollars elsewhere.

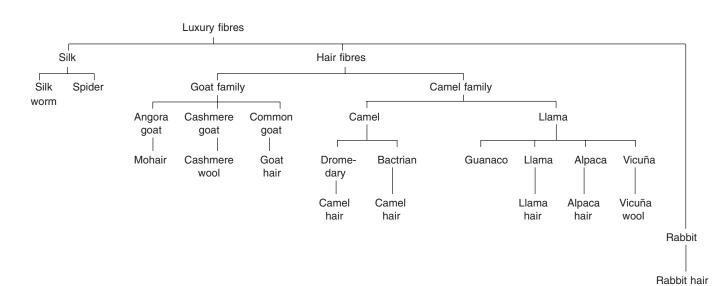
Should the damage to the product's image be serious it may have difficulty in recovering its market, and two examples of events which have damaged a fibre's image are included in the book. Although difficult to prove direct cause and effect, these two cases (sand washed silk and poor quality cashmere knitwear) probably led to a decrease in consumer acceptance for a few years. In both cases, the poor quality of the product led to its own demise and luckily, the damage done to the reputation of the fibres concerned was not permanent.

Whilst it is very difficult for Trade Associations and others concerned to prevent all such occurrences, remedial and preventative measures are possible, from regulatory action to more effective marketing and promotion. However, these require unity of purpose, adequate marketing budgets, and the co-operation of all concerned. These are not always forthcoming.

Finally, although spider silk is not a luxury fibre in our general sense of the term, we have included it in this book because very little has been published about it. We do believe that the subject will be of sufficient interest to textile professionals to warrant its inclusion and so provide a wider circulation of information concerning this recent development in textiles.

### Acknowledgements

Many have helped by supplying information and advice on the fibres covered in this book. The Editor would particularly like to thank the following for their help and encouragement: Joyce Dalton (Dalton Lucerne), Nan Kern (Cashmere and Camel Hair Manufacturers Association), Don Fox (Forte Cashmere Company) and Francis Rainsford (Internacional de Commercio). The Editor would also like to acknowledge Antonio Canevarolo who provided the photographs for Pier Alvigini's book, *The Fibres Nearest the Sky*.



Animal and insect producers of luxury fibres (after W Von Bergen).

# Contents

Prefe	ix	
Ackr	nowledgements	xi
1	Silk RONALD CURRIE	1
1.1	Introduction and history	1
1.2	Silk fibre and its characteristics	9
1.3	Silkworm rearing and cocoon production	11
1.4	Reeling and yarn production	20
1.5	Raw silk testing and classification	24
1.6	Yarn and fabric manufacture	28
1.7	The care of silk	35
1.8	Sand-washed silk	37
1.9	The market position of silk	39
1.10	Silk production and trade today	40
1.11	Silk producing countries	48
1.12	8	55
1.13	What about the future?	60
	Acknowledgements	66
	Bibliography	67
2	Mohair	68
	LAWRANCE HUNTER AND MRS E L HUNTER	
2.1	Introduction and brief history	68
2.2	Chemical and physical fibre properties	74
2.3	Fibre production and early processing	88
2.4	Yarn and fabric manufacture	104
2.5	Mohair production in various countries	109

vi	Conte	nts	
2.6	Marketing and cost considerations Acknowledgements References		
3		ere, camelhair and other hair fibres	133
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 3.10	Introduction Cashmere, Pashmina and Cashgora Camelhair Alpaca fibre Llama fibre Vicuña fibre Guanaco fibre Angora Yak fibre		133 136 143 147 152 154 158 162 166 170 173 174
Glos	sary		175
Арре	endix 1 endix 2 endix 3	International trade rules for raw silk and other products of silk Spider silk Composition of mohair fibres and of amino acids	179 189 191
Appendix 4 Appendix 5 Appendix 6 Appendix 7 Appendix 8		Mohair yarn spinning and properties Mohair fibre and fabric properties Mohair dyeing and finishing Mohair product list Rules for the use of the Mohair trade mark (label)	198 210 213 214 219
Appendix 9 Appendix 10 Appendix 11		Scotland and China and cashmere trade Quality assessment of goat hair for textile use Luxury flame retardant fabrics for aircraft applications	220 227 234

243

Index

# Contents

Prefe	ix	
Ackr	nowledgements	xi
1	Silk RONALD CURRIE	1
1.1	Introduction and history	1
1.2	Silk fibre and its characteristics	9
1.3	Silkworm rearing and cocoon production	11
1.4	Reeling and yarn production	20
1.5	Raw silk testing and classification	24
1.6	Yarn and fabric manufacture	28
1.7	The care of silk	35
1.8	Sand-washed silk	37
1.9	The market position of silk	39
1.10	Silk production and trade today	40
1.11	Silk producing countries	48
1.12	8	55
1.13	What about the future?	60
	Acknowledgements	66
	Bibliography	67
2	Mohair	68
	LAWRANCE HUNTER AND MRS E L HUNTER	
2.1	Introduction and brief history	68
2.2	Chemical and physical fibre properties	74
2.3	Fibre production and early processing	88
2.4	Yarn and fabric manufacture	104
2.5	Mohair production in various countries	109

vi	Conte	nts	
2.6	Marketing and cost considerations Acknowledgements References		
3		ere, camelhair and other hair fibres	133
3.1 3.2 3.3 3.4 3.5 3.6 3.7 3.8 3.9 3.10	Introduction Cashmere, Pashmina and Cashgora Camelhair Alpaca fibre Llama fibre Vicuña fibre Guanaco fibre Angora Yak fibre		133 136 143 147 152 154 158 162 166 170 173 174
Glos	sary		175
Арре	endix 1 endix 2 endix 3	International trade rules for raw silk and other products of silk Spider silk Composition of mohair fibres and of amino acids	179 189 191
Appendix 4 Appendix 5 Appendix 6 Appendix 7 Appendix 8		Mohair yarn spinning and properties Mohair fibre and fabric properties Mohair dyeing and finishing Mohair product list Rules for the use of the Mohair trade mark (label)	198 210 213 214 219
Appendix 9 Appendix 10 Appendix 11		Scotland and China and cashmere trade Quality assessment of goat hair for textile use Luxury flame retardant fabrics for aircraft applications	220 227 234

243

Index