LIFE13 ENV/IT/000470 "ECODEATTING"
Environmentally friendly natural products instead of chemical products in the degreasing phase of the tanning cycle

Action B2 of the project
Defatting at a semi-industrial level by using natural products

Beneficiary responsible for implementation: INESCOP, ICCOM, UNIFI

Formulation EDF20 was employed in defatting sheep and pig skins, as well as cow hides, scaling up the work procedure to mimic a pilot scale process for routine production implementation.

Duration

01.10.2014 to 30.09.2016

Total Budget

€ 1,035,556.00

EU contribution

€ 517,778.00

Coordinating beneficiary

Chemical Department "Ugo Schiff" Florence University (IT)

Associated beneficiaries

Chemical Institute of organometallic compounds of CNR (IT)

Newport Srl (IT)

Asociación de Investigación para la industria del calzado (ES)

Contacts

Mrs. Mercedes Roig
Inescop (ES)
mroig@utvall.inescop.es.

Dr. Emilia Bramanti
National Research Council (IT)
Institute of Chemistry of Organometallic Compounds
bramanti@pi.iccom.cnr.it

Prof. Roberto Bianchini
Department of Chemistry
The University of Florence (IT)
roberto.bianchini@unifi.it

Degreasing Agent EDF20

Component	%(w/w)
Lactose product	25.0
Water	45.0
Iso-C10-5mEO	25.0
Co-solvent	5.0

Work operation

Sheep skin

Pickled skin

Defatted skin

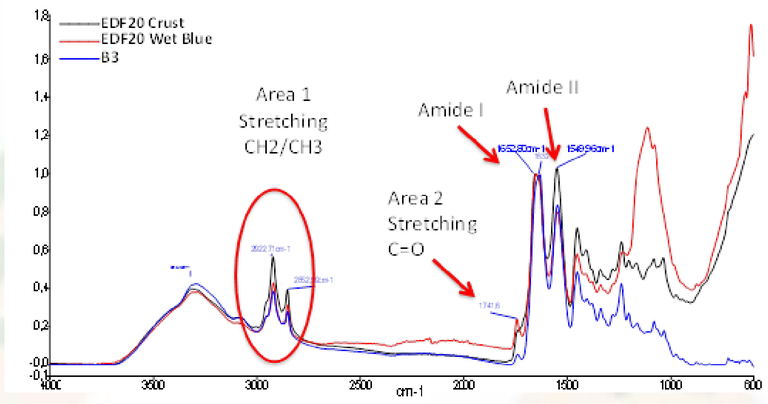
Crust skin

Wet blue skin

Defatting demonstrations

Skin	EDF20 (%)	Substances extractable from dry matter	Fatty substances extraction (%)
Sheep	2	2,2	42,1
	3	2,1	44,7
	4	1,8	52,6
	5	1,6	57,9
Cow	2	2,1	53,6
	4	3,0	60,7
Pig	4	5,3	52,7
	6	4,7	58,0

FT-IR analysis of end process skins



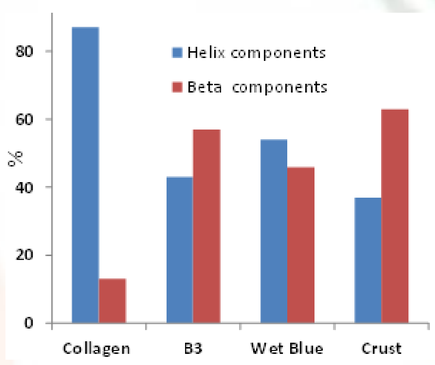
Work Procedure

Stage	%	Product	°C	Rotation Time (min.)	pH	Remarks
De-pickling	100%	water	20			
	10	Salt		30		8 °Be
	3	$NaHCO_3$		180	> 6	Check pH
						Drain
Defatting	100	water	35			
	10	Salt		15		8 °Be
						Drain
	100	water	35			
	10	Salt		10		8 °Be
	X	Defatting agent		60		
						Drain
	100	water	35			
	10	Salt		15		8 °Be
						Drain
	100	water	30			
	10	Salt		15		8 °Be
						Drain
	100	water	25			
	10	Salt		15		8 °Be
						Drain
Pickling, Tanning	60	water	20			
	8	Salt		10		6-7 °Be
	0,8	H_2SO_4 1:10		30		
	0,8	HCO_2H 1:5		10	2.8-3.0	Check pH
	6	Cr salt		60		
	1,2	MgO		ovn		Check pH=4
	0,1	Fungicide		20		
						drain

Physical tests

Skin	EDF20	Thickness (mm)	Tear strenght (N)	Tensile strenght (N/mm^2)	Elongation at break (%)
Sheep	2	1.2	61.1	15.4	65.0
	3	1.3	59.4	15.9	63.0
	4	1.1	62.5	16.3	67.0
	5	1.2	63.0	15.7	71.0
Cow	2	1.3	86.0	25.4	52.7
	4	1.1	81.5	22.4	58.0
Recommended			30.0	12.0	40.0
Pig	4	1.1	63.0	9.7	41.0
	6	1.1	65.0	8.2	46.0
Recommended			30.0	8.0	30.0

The leather samples have higher content of β-sheet structures, but the percentage of the helix components decreases compared to that of simple collagen. The leather crust and wet blue samples present negligible changes, meaning that the defatting process performs consistently.



Thermogravimetryic analysis

Leather Sample	I (°C)	II (°C)	III (°C)	IV (°C)	V (°C)	Residue %
B3	66	315	394	523	863	7.1
Leather Wet-Blue EDF20	63	318	388	512	807	6.3
Leather Crust EDF20	61	319	380			7.3

The humidity entrapped by leather fibres is released at Peak I. The main decomposition of B3 and wet blue leather takes place at Peak II III and IV, whereas crust leather decomposes mainly at II and III. The wet blue leather is the stage before dyeing and fat liquoring, whereas the crust is the final tanned leather. It is reasonable to assume that the difference in the degradation steps is due to those steps occurring after tanning.