

# ODOR: AN IMPORTANT PROBLEM IN LEATHER INDUSTRY

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One of the most important indications that announce the availability of the leather industry to the environment is odour. Addition to odours released as a result of both raw skins and hides are organic materials, and chemical reactions occurred between chemicals used in processing and leather, some odours is also to spread from waste water treatment facilities. All over the world, odour is one of the problems that are mostly complained to the environmentalist foundations and organizations.

KEY WORDS: Odour, Leather, Tanning, VDA 270

## 1. INTRODUCTION

Human being, using meats for food, was left with a rigid material which is easily putrescible, yet, right from Palaeolithic times, discovered that special treatments should make it durable, strong, soft and flexible. Therefore, the leather making is one of the oldest crafts on the World. The tannery operation consists of converting the raw hide or skin, a highly putrescible material, into leather, a stable material, which can be used in the manufacture of a wide range of products. Therefore, the production of raw hides and skins depends on animal population and slaughter rate and is related mainly to meat consumption<sup>1</sup>. The whole process involves a sequence of complex chemical reactions and mechanical processes.

In the public imagination a tannery is reminiscent of smells, polluted water and contaminated soils<sup>2</sup>. The process of making leather has always been associated with odour and pollution, and as it seemed to be an inevitable consequence of the activity at the time, in some cultures people engaged in this industry rarely enjoyed a high social status<sup>1</sup>. In other words, odour is one of well-known words used for being descriptive the leather industry. Most odour complaints against industry have centred on animal products processing activities<sup>3</sup>. Odours are not quantifiable, but they frequently give rise to complaints from neighbours<sup>1</sup>.

Our environment must fulfil a number of requirements if it is to be attractive to us. Aesthetic, social and psychological aspects are important here<sup>4</sup>, but also factors like the sound environment and air quality may be significant<sup>5</sup>. Odour, which refers to unpleasant smells, is considered as an important

environmental pollution issue. Odour substances emitted from any source will be regarded important in the context of odour pollution if they are dispersed in the surrounding area. Attention to odour as an environmental nuisance has been growing as a result of increasing industrialization and the awareness of people's need for a clean environment. As a consequence, efforts to abate odour problems are necessary in order to maintain the quality of the environment<sup>6</sup>. Emitted malodour and odorants from odour generating operations may be major problem for the neighbourhood. In this framework, understanding the odour problem and the origin and dispersion of odours, abatement and detection methods are, therefore, very important aspects of odour pollution in the environment<sup>5</sup>. When people perceive what they regard as unacceptable amounts or types of odour, odorous emissions can become an "odour problem". Simply, an odour problem results from an odour that is unpleasant<sup>7</sup>. An important parameter for odour impact is the odour concentration. Odour reflects the human response to odorants in the air and the base for odour concentration is the human odour threshold. Odour threshold refers to the lowest detectable concentration. An odour contains hundreds of different gases where each gas has its own human odour threshold<sup>8</sup>. Women have often shown better results than men in studies regarding odour olfactory sensitivity<sup>9</sup>. The olfactory function has also been shown to decline by age<sup>10</sup>.

Leather is known for its particularly high gas emissions. These emissions can sometimes be high enough to cause nuisance and discomfort. These emissions can sometimes be high enough to cause nuisance and discomfort<sup>7</sup>. Releases to air can arise from various process steps carrying different substances and particulates<sup>1</sup>. Therefore, early European legislation on a local level, regulated smelly activities such as slaughtering and tanning of hides, typically by deciding that this should be done outside of the town, or downstream on the river.

In this paper, it is reported odour intensity obtained from each production step in a typical clothing sheepskin production, according to VDA 270.

## **2. MATERIAL AND METHOD**

### **2.1. Material**

In this study, 20 fresh sheepskins was processed according to a typical clothing leather recipe. 30 cm X 30 cm size samples for evaluating leather odours were taken from the neck, butt and shank areas of the skins at the end of main process steps. After wet processing, three leathers was finished as solvent-based, other three leathers as water-based.

## 2.2. Method

### 2.2.1. Odour Analysis

Samples taken from leather were put in a dessicator of 1 l for 24 hours. Then, in turn, the leathers were smelt by the odour panel. The panel of six people was evaluated the odours (Table I) according to VDA 270- *Determination of the odour characteristics of trim materials in motor vehicles* (Table II).

**Çizelge I.** Odour Intensity

Level	Evaluation
1	Very Weak, not perceptible odour
2	Weak, perceptible but not annoying
3	Distinct but not annoying
4	Strong, annoying
5	Very Strong, more annoying
6	Extremely Strong, extremely annoying and disgusting

**Çizelge II.** Panel Profile

Panelist No	Sex	Age
1	Female	27
2	Male	32
3	Female	32
4	Male	30
5	Female	27
6	Male	38

### 2.2.2. Statistical Method

In this study, SPSS 11.5 pocket programme were used for evaluations of the odours data obtained. Odour analysis stage was evaluated according to one-way analysis of variance test. Significance level is  $\alpha=0.05$ .

## 3. RESULTS AND DISCUSSION

**Table III.** Odour in raw hides

Panelist No	Sex	Age	Points		
			I	II	III
1	Female	27	3	3	4
2	Male	32	3	3	3
3	Female	32	3	4	3
4	Male	30	4	3	3
5	Female	27	4	4	3
6	Male	38	3	3	3

**Table IV.** Odour in soaking process

Panelist No	Sex	Age	Points		
			I	II	III
1	Female	27	4	4	4
2	Male	32	4	3	3
3	Female	32	4	4	3
4	Male	30	3	3	4
5	Female	27	3	4	5
6	Male	38	4	4	4

**Table V.** Odour in limed pelts

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	5	4	5
<b>2</b>	Male	32	5	5	4
<b>3</b>	Female	32	6	5	5
<b>4</b>	Male	30	5	5	4
<b>5</b>	Female	27	5	5	6
<b>6</b>	Male	38	4	5	6

**Table IX.** Odour in wet-blue leathers

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	3	4	4
<b>2</b>	Male	32	4	4	4
<b>3</b>	Female	32	3	3	4
<b>4</b>	Male	30	4	4	3
<b>5</b>	Female	27	5	4	4
<b>6</b>	Male	38	4	3	4

**Table VI.** Odour in delimed pelts

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	5	6	5
<b>2</b>	Male	32	6	4	5
<b>3</b>	Female	32	5	5	4
<b>4</b>	Male	30	5	5	4
<b>5</b>	Female	27	5	6	5
<b>6</b>	Male	38	5	6	5

**Table X.** Odour in leathers from wet-end processes

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	3	2	3
<b>2</b>	Male	32	2	3	3
<b>3</b>	Female	32	3	3	3
<b>4</b>	Male	30	3	4	3
<b>5</b>	Female	27	4	3	3
<b>6</b>	Male	38	2	3	3

**Table VII.** Odour in bated pelts

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	6	4	5
<b>2</b>	Male	32	4	5	5
<b>3</b>	Female	32	5	5	4
<b>4</b>	Male	30	5	5	4
<b>5</b>	Female	27	6	5	5
<b>6</b>	Male	38	4	6	5

**Table XI.** Odour in solvent-based finished leathers

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	3	2	4
<b>2</b>	Male	32	3	3	2
<b>3</b>	Female	32	3	4	3
<b>4</b>	Male	30	3	2	3
<b>5</b>	Female	27	2	2	3
<b>6</b>	Male	38	3	2	2

**Table VIII.** Odour in degreased pelts

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	5	5	5
<b>2</b>	Male	32	3	4	3
<b>3</b>	Female	32	5	4	4
<b>4</b>	Male	30	4	4	5
<b>5</b>	Female	27	4	6	3
<b>6</b>	Male	38	5	5	4

**Table XII.** Odour in water-based finished leathers

Panelist No	Sex	Age	Points		
			I	II	III
<b>1</b>	Female	27	3	3	2/3
<b>2</b>	Male	32	2	2	4
<b>3</b>	Female	32	3	2	3
<b>4</b>	Male	30	4	4	5
<b>5</b>	Female	27	3	2/3	2/3
<b>6</b>	Male	38	3	2	2

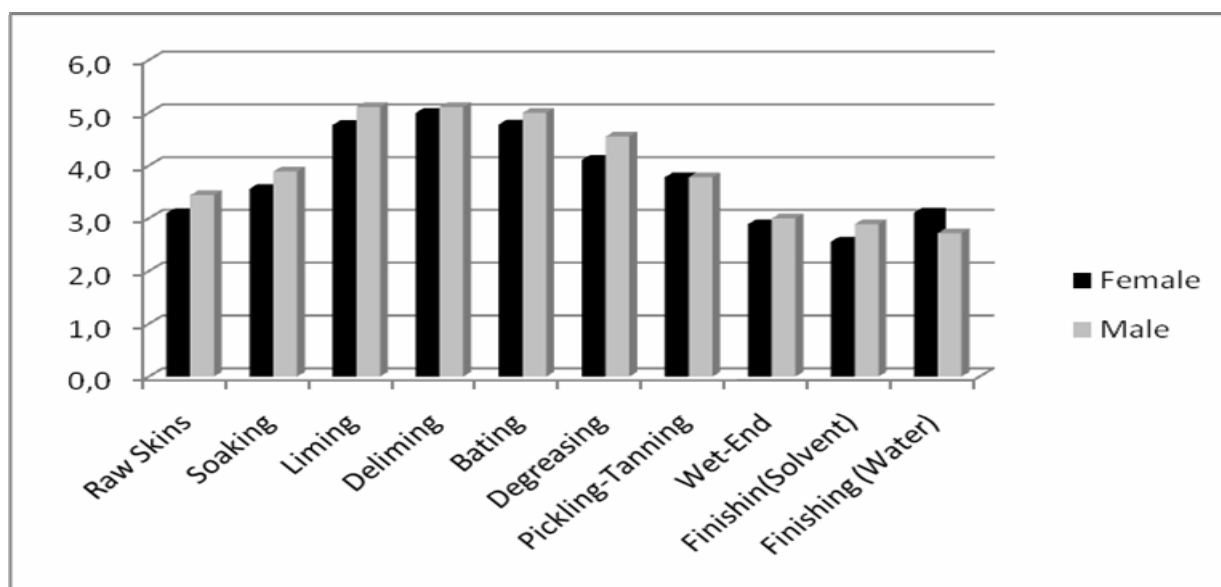
It can be seen that odour intensity of samples has a tendency to increase from raw skins to liming, deliming and bating processes in figure 1. As known, the function of liming and unhairing is to remove hair, interfibrillary components and epidermis and to open up the fibre structure. Hair removal is performed by chemical and mechanic means. The keratinous material and fat are eliminated from the pelts mainly with sulphides and lime. Ammonia can be formed in deliming process. Odour emissions from raw hides can be controlled by ensuring correct curing procedures, improving storage conditions and ensuring adequate stock rotation. In this study the fresh sheepskins were used and so odour intensity was

evaluated lower than liming, deliming and bating. In these steps, odour panel evaluated the odour intensity between 3-4 for raw skins (i.e., distinct, not annoying); and 4-5 for liming, deliming and bating (i.e., very strong, very annoying). Deliming process had more annoying impact than liming and bating.

**Table XIII.** Evaluation of odour of the panel

Process	Male (Average)	Female (Average)	Average
Raw skins	3.11	3.44	3.33
Soaking	3.56	3.89	3,72
Liming	4.77	5.11	4.94
Deliming	5.00	5.11	5.05
Bating	4.78	5.00	4.89
Degreasing	4.11	4.55	4.33
Pickling-Tanning	3.78	3.78	3.78
Wet-End	2.89	3.00	2.94
Finishing (Water-based)	3.11	2.72	2.80
Finishing (Solvent-based)	2.56	2.89	2.72

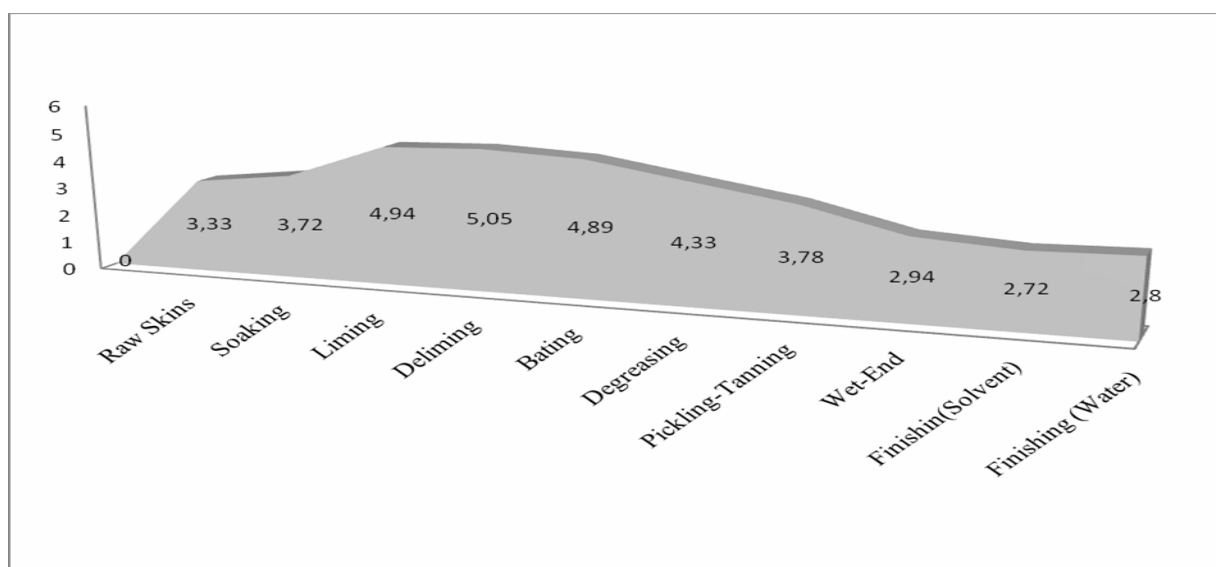
Both of males and females were qualified the wet-blue leather samples as 3.78, i.e., distinct but not annoying. Odours of the processing steps after tanning were evaluated as weak and perceptible but not annoying, except that males in the odour panel having a different assessment for water-based finish. This step for male was distinct (Table XIII).



**Figure 1.** Odour evaluation of the panel in the leather making steps

#### 4. CONCLUSION

In this study, odours for each leather processing steps were evaluated by a odour panel (figure 2). The strongest odour in the processes steps for the panel was deliming. In other words, deliming process was very strong and more annoying. Also, liming and bating were processes annoyed. Other leather odours were classified as “perceptible” but “not annoying”. Except that water-based finish, females were evaluated the odours more annoying than males.



**Figure 2.** Odour intensity of the leather making processes

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