

# ARE LEATHER PROPERTIES A FUNCTION OF THE CATTLE BREED?



Angus



Limousin



Charolais



Simmentaler



Holstein

## INTRODUCTION

Since hundreds of years, tanners share the opinion that hides from different cattle breeds lead to varying leather characteristics. Especially European hides from the alpine region (e. g. Simmentaler or brown origin) are preferred by tanners. These leathers feature a higher thickness, a maximum utilization induced by a minor thickness difference over the whole area and a lower tensile strength in contrast to leathers from other breeds [1]. To date, cattle breeds have extremely changed by genetic breeding programs to raise their economic traits (e. g. milk yield, maternal ability, feed efficiency) [2]. Additionally, present dairy and beef cattle are high-performance cattle, which leads to more crossbreeds than 100 years ago. However, there is the question whether these alpine hides are better because of their breed affiliation or because their regional husbandry conditions. It is known that, besides the breed, also other factors can influence the rawhide and leather properties like age, gender, nutrition and climate conditions [3, 4]. Our intention was to find out, whether leather characteristics nowadays are still a function of breed or not.

## METHODS

### COLLECTION OF SKIN SAMPLES

- Considered breeds: Simmentaler, Holstein, Angus (widespread occurrence in Germany), Limousin and Charolais
- From every breed: 10 hides (5 male, 5 female, age: under 5 years)

### LEATHERS AND TEST SAMPLES

- Leather producing: lime-sulfide liming, mechanical flesh removing, formic and sulphuric acid pickling, chrome tanning, fatliquoring, dyeing, drying

### PHYSICAL MEASUREMENTS

- Tensile strength and elongation at maximum force (DIN EN ISO 3376), Stich tear strength (DIN EN ISO 23910)

## RESULTS

### THICKNESS OF THE RAWHIDES:

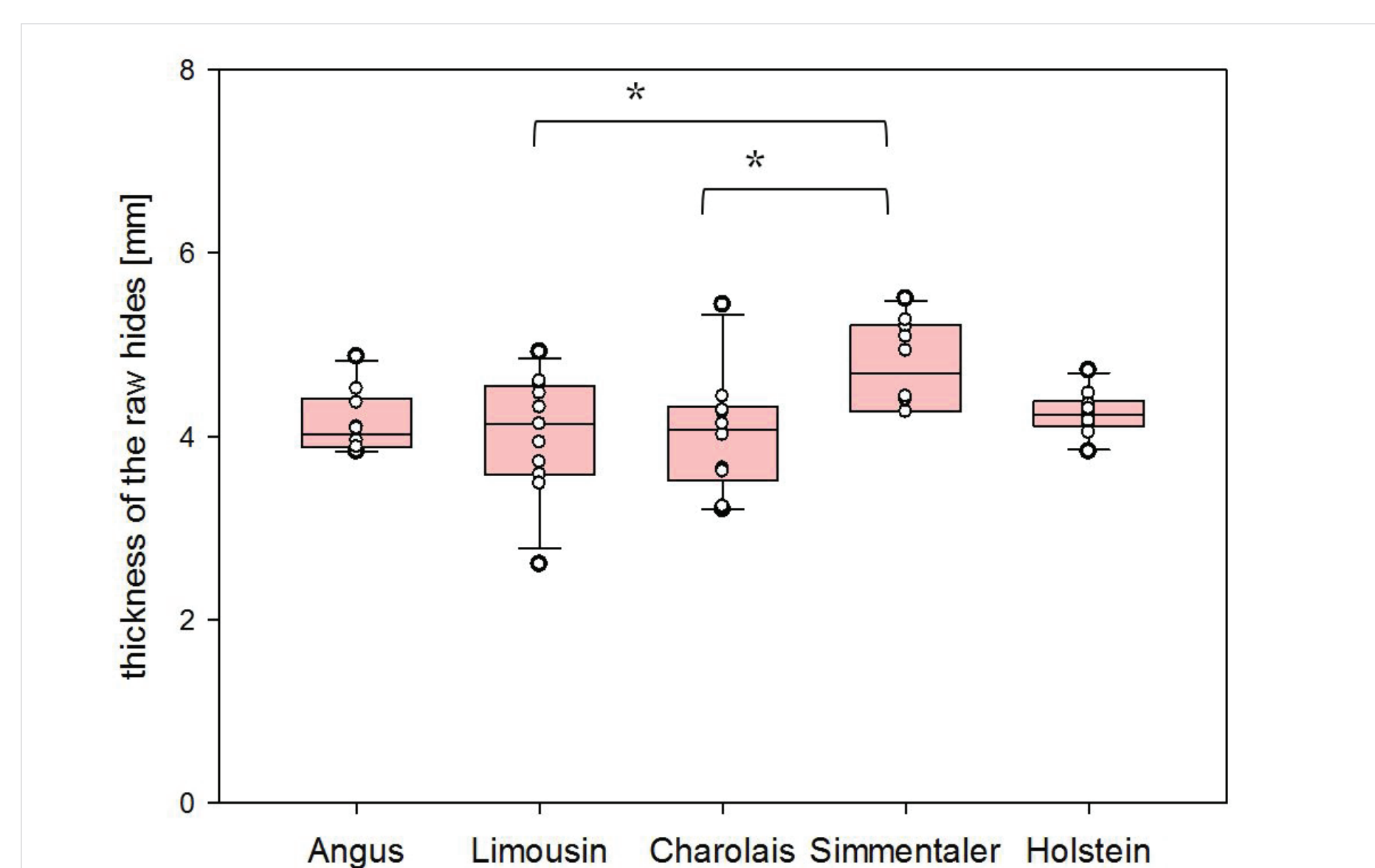


Figure 1\Thickness of the rawhides in dependence of the breed (Significance code: \*\* 0.05)

Simmentaler rawhides show the highest thickness compared to the other tested breeds. This is in accordance to the measurements of the workgroup of Hausam from 1952 [1], who also showed, that breeds with south german origin (such as Simmentaler) have a higher thickness in contrast to other breeds.

For Holstein rawhides, the variance was the smallest, which means that Holstein individuals deliver hides of mostly constant thickness independent from gender or age (age variance 13 months up to 56 month).

### TENSILE STRENGTH OF THE LEATHERS:

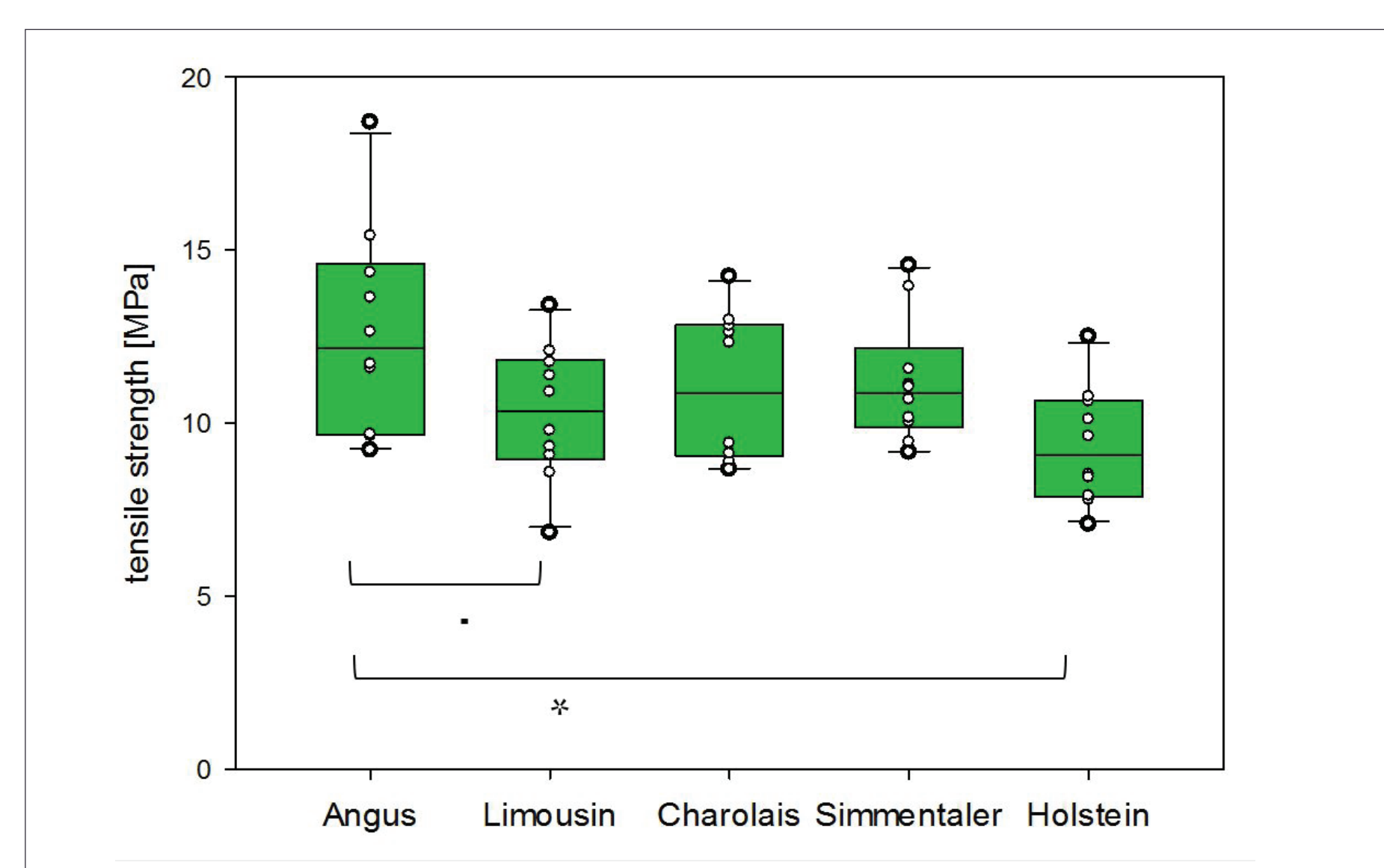


Figure 2\Tensile strength of different leathers in dependence of the breed (Significance codes: ' 0.1, '\*\* 0.05)

Leathers with Limousin or Holstein origin feature the lowest tensile strength (in dependence of the chosen tanning procedure). In our study, leathers with Angus origin showed the highest tensile strength when compared to Limousin or Holstein. However, the variation within the breeds are mostly higher than between the breeds.

### ELONGATION AT MAXIMUM FORCE:

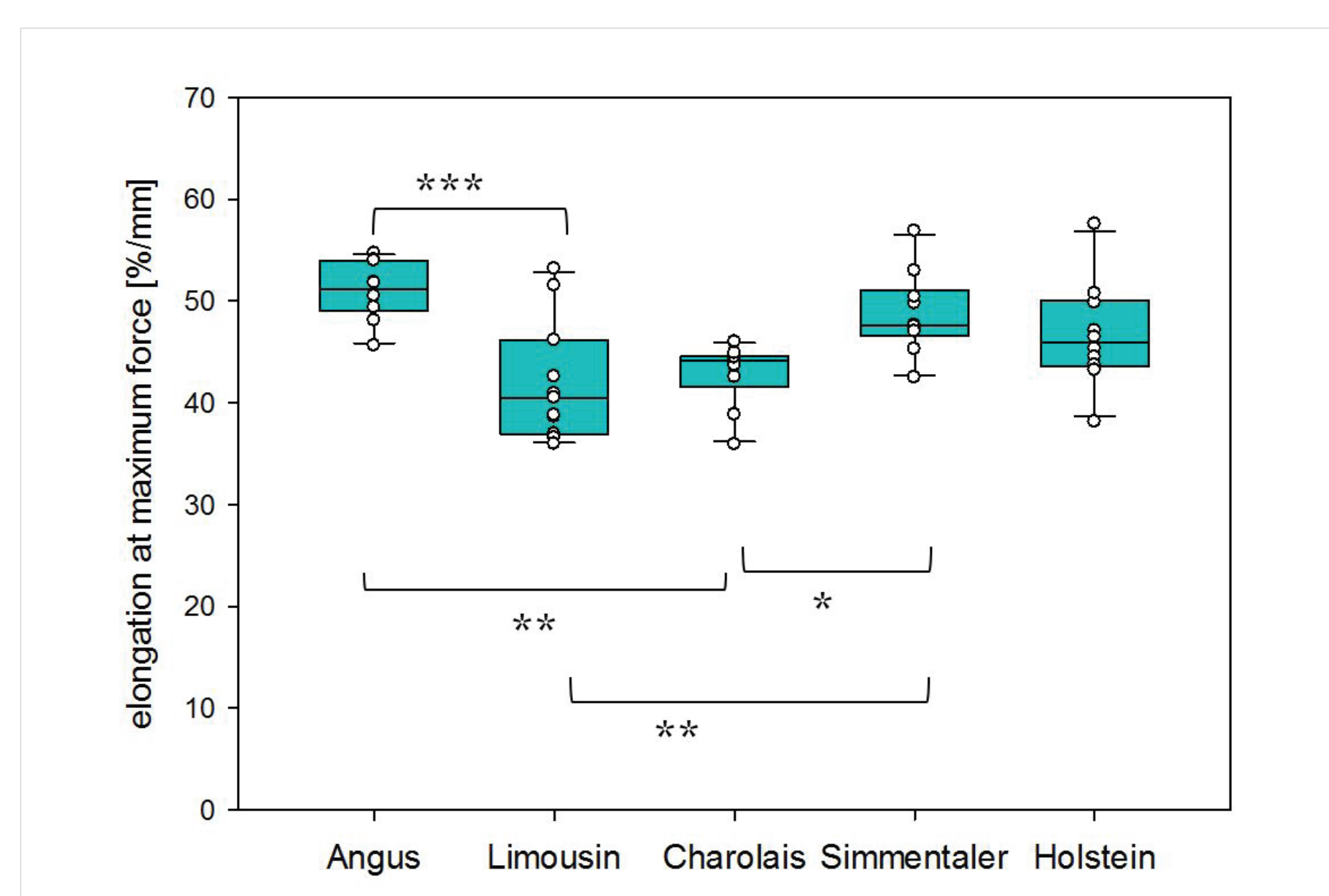


Figure 3\Elongation at maximum force (normalized to thickness) in dependence of the breed ((Significance codes: ' 0.1, '\*\* 0.05, '\*\*\* 0.01, '\*\*\*\* 0.001)

Leathers with Limousin and Charolais origin feature the lowest elongation at maximum force. Although, the variation within the breeds are quiet high, significant differences of both breeds compared to Angus and Simmentaler could be observed.

### STICH TEAR STRENGTH:

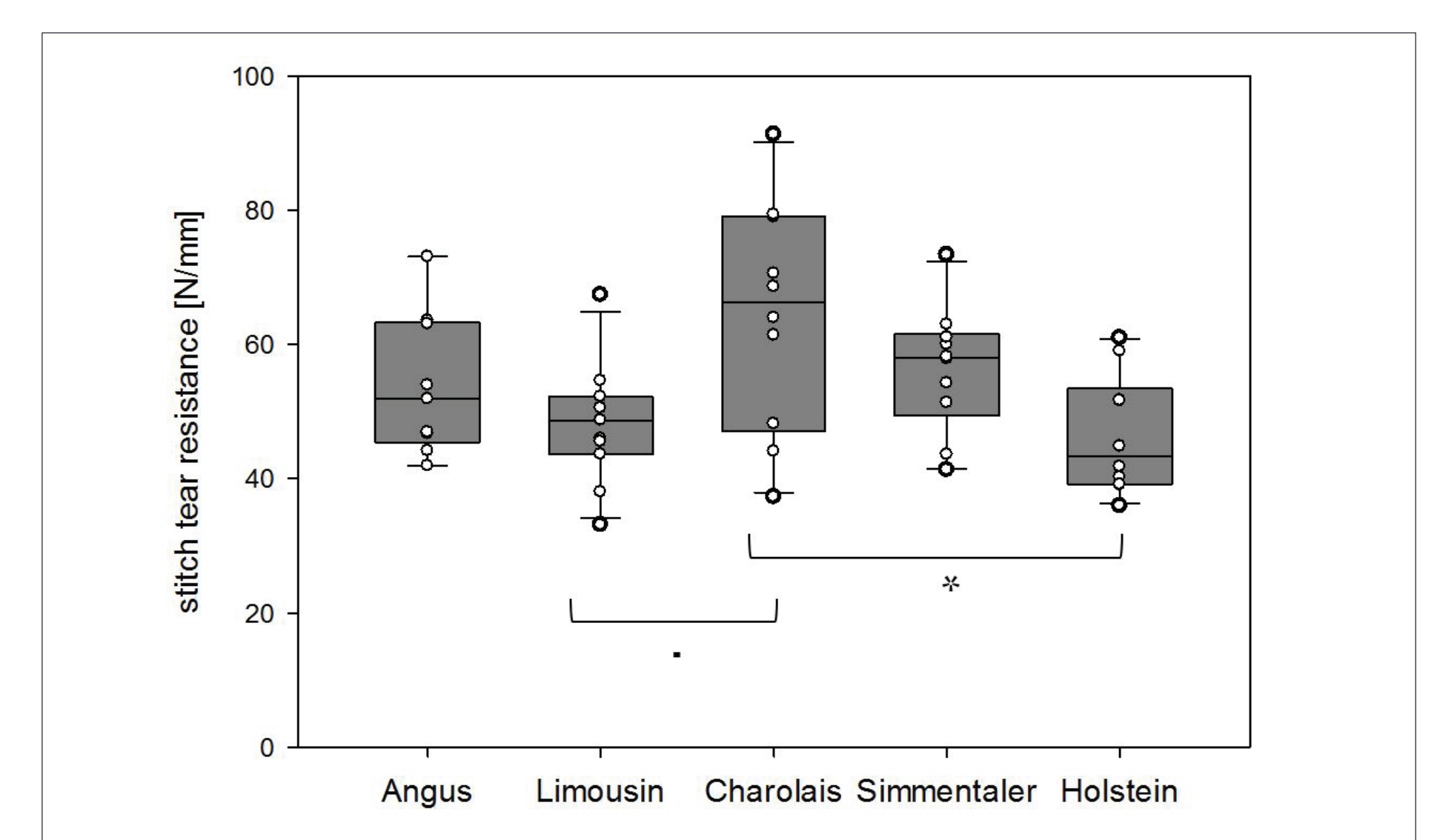


Figure 4\Stich tear strength (normalized to thickness) in dependence of the breed (Significance codes: ' 0.1, '\*\* 0.05)

Leathers with Charolais origin feature the highest Stich tear strength, but also the highest in- group- variation. The lowest Stich tear strength was measured in the Limousin and Holstein group. However, the variation within the breeds are again mostly higher than between the breeds.

## CONCLUSIONS

In summary, the results indicate, that the over- hundreds- of- years- raised tanners opinion can be partially disproved. Simmentaler rawhides have the highest thickness, but differences in physical tests are approximately mostly negate when transformed to leathers. The tensile strength, the elongation at maximum force and the Stich tear strength of different leathers showed only minor differences between the cattle breeds. The variation within the breeds were constantly on a high level. However, this evaluation is based only on 10 individuals per breed, and the measured tendency must be confirmed by a larger quantity of test individuals.

## REFERENCES

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## PHOTO CREDITS

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 Limousin: [https://commons.wikimedia.org/wiki/Category:Limousin\\_cattle#/media/File:Limousin-cow01.jpg](https://commons.wikimedia.org/wiki/Category:Limousin_cattle#/media/File:Limousin-cow01.jpg)  
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