



Velvet and Immunity



New Zealand
Deer Velvet

A SCIENCE UPDATE

Used in traditional medicines, deer velvet antler has long been valued for helping boost immunity. It is now increasingly popular as an ingredient in modern healthy food products. Claims for health benefits such as enhanced immunity in these products need to be supported by sound science in order to satisfy regulatory requirements.

Preliminary research carried out in New Zealand has completed the first essential steps in this process. This brochure summarises what has been discovered so far.

IMMUNITY

Health is protected through two types of immunity: innate and adaptive. These two processes complement each other.

Innate immunity is the body's first line of defence against foreign organisms. It works quickly and aggressively but isn't very targeted. **Adaptive** cell immunity is the next line of defence. It works more slowly but learns to recognise particular invaders so these can be quickly picked out and attacked if they appear again. Antibodies, B cells and T cells are produced by the adaptive immune system.



Preliminary research funded by the New Zealand deer industry and AgResearch focused on the effects of deer velvet extracts on the functions of the **innate** immune system, but **adaptive** immunity also featured in the results.

EFFECT OF VELVET EXTRACTS ON INNATE CELL IMMUNITY

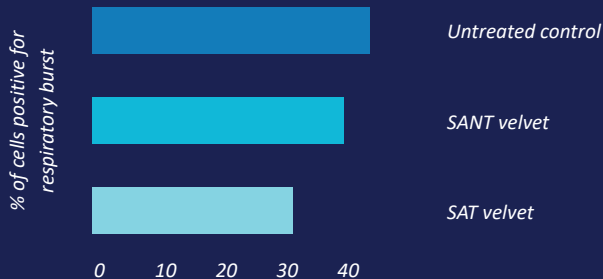
A 2021 study¹ used 10 velvet extracts that were used in earlier velvet composition research (see below). New Zealand's two main velvet grades featured: SA Traditional (SAT) and SA Non Traditional (SANT). The *in vitro* tests used velvet extracts and white blood cell samples (leukocytes) provided by human donors.

Damage to immune cells suppressed?

The researchers looked closely at the immune process and found an interesting effect from some of the velvet extracts.

When a white blood cell consumes foreign bacteria, it produces a “respiratory burst” of reactive oxygen species (ROS) to kill bacteria. If this “respiratory burst” becomes too strong, it can damage immune cells and other cells of the body – not the best outcome.

In the samples that were treated with SAT velvet extracts, significantly *less* ROS was produced. This means that immune cells could be better protected as they do their job fighting infections.



Percentage of cells affected by reactive oxygen species (ROS) was significantly lower in samples treated with SAT velvet extracts (simplified).

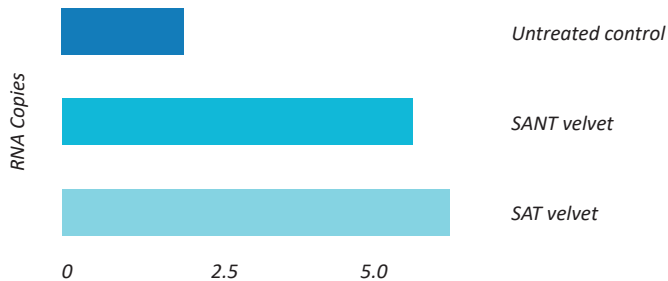
¹ Heiser A, Haack N, Ross M, Haines S (2021). Deer velvet and innate cell immunity: Comparative effects of SAT and SANT grades. AgResearch, Palmerston North

Gene expression changed

The researchers tested whether treatment with SAT or SANT velvet extracts affected the way key genes were expressed in the **adaptive** immune system. Nineteen genes were investigated and two stood out: IL-2 and ITGAM.

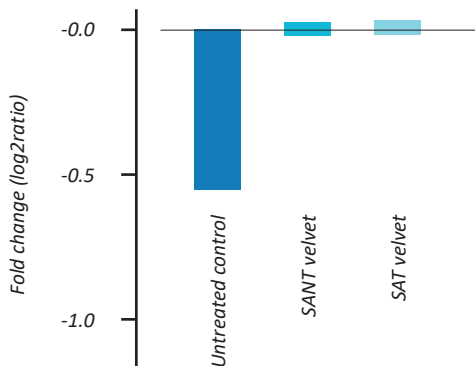
Both of these make proteins that help regulate immune response and both were significantly affected by the addition of a velvet extract.

IL-2 (Interleukin-2) helps leukocytes do their job more accurately, killing the invading organisms that need to be killed while avoiding damage to the host. In the velvet-treated samples there were significantly more RNA copies to produce IL-2.



Effect of velvet extracts on expression of IL-2 (simplified).

ITGAM (Integrin alpha M) helps regulate the way leukocytes move around and interact with other cells. The gene that produces ITGAM can be downregulated by a disease organism, but when the velvet extracts were introduced, this didn't happen. The white blood cells could get on and do their work without interference.



Effect of velvet extracts on downregulation of ITGAM (simplified).

VELVET COMPOSITION

An earlier 2021 study² analysed the composition of New Zealand's two main velvet grades: SA Traditional (SAT) and SA Non Traditional (SANT). In the 10 velvet stick samples (five from each grade) there was essentially no difference – amino acid profiles were very similar.

However if these protein “building blocks” are arranged differently within a protein, their functions can be different. It's a bit like two bakers with the same set of ingredients but using different recipes and turning out different types of cake. This means there is scope for different bioactive products from different types of velvet antler, even though the basic composition is the same. We need to know more about this.

² Haines SR (2021). *Comparative composition of Super A Traditional and Non-Traditional deer velvet grades.* AgResearch, Lincoln, Canterbury, New Zealand.



Photo courtesy of Choonwondang Hospital of Korean Medicine

WHAT DOES ALL THIS MEAN?

This preliminary work showed that deer velvet extracts do have an impact on aspects of the human immune system. Most importantly it showed:

- it could better protect immune cells from damage while they're killing invaders
- it could help immune cells work more accurately and effectively.

Is this good news?

Yes! It shows velvet extracts can have a measurable effect on immune function and this could lead the way to supporting verified health claims for deer velvet.

WHAT NEXT?

This is just the beginning. To get to that next stage there needs to be more work in these areas:

- preparation of extracts
- adaptive immune function testing at cellular level
- testing using animal models
- identifying the bioactive components in deer velvet that affect immune function
- investigating the impact on composition and function of management factors such as time of velvet harvest.

For further information please visit www.velvet.nz or email info@deernz.org

