

# 鹿茸：从动物到产品 (Velvet Antlers: From the Deer to the Product)

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**摘要** 鹿茸快速生长和再生的特性已使东西方的学者惊惑几千年。现今鹿茸在东方国家是有价值的保健产品，这一点也在逐渐被西方国家所接受。虽然不同国度、不同鹿种的鹿场生产体系不一，但亚洲，澳洲和北美的鹿业已满足了对这种产品的需求。我们以为养鹿业的鹿茸生产是一条线，贯穿这条线的是从养鹿到鹿茸的收获、加工以及销售。我们在茵沃梅所进行的研究工作几乎涉及到了这条线的每个部分，同时这些研究工作又是通过这条线被有机的结合到一起的。这种情形在世界上也是独特的。

鹿茸生长方面的研究主要涉及两个主要方面：角柄和初角茸的发育和鹿茸的生长过程。我们的研究表明，繁殖类固醇是控制鹿茸角发育周期的基本因素，而生长因子则是主要用来调控鹿茸的生长。角柄的发生取决于酮和生长因子的水平，但初角茸发生则独立于睾酮。

在培养条件下，胰岛素样生长因子是鹿茸细胞生长很强的刺激剂。很多这方面的因子控制鹿茸生长不是通过内分泌，而是通过自分泌或旁分泌。生长鹿茸尖部的许多生长因子的基因表达已通过分子生物学的手段进行了研究。鹿茸生长的类型与胚胎四肢的形成类似。

不同生长阶段的鹿茸（30到100天）的成分已被研究。结果表明，主要化学成分的增长率有很大的差异。例如，不同部分鹿茸组织的灰分含量和生长阶段的回归有非常显著的差异，

鹿茸中特种蛋白和脂质类的分布,以及不同成熟阶段的影响也已进行了研究。细胞培养研究表明,从不同鹿茸生长阶段得到的提取物,在杀死癌症细胞的作用方面不同。这一点显示了根据不同医学特性生产鹿茸产品的可能性。

茵沃梅所进行的鹿茸研究都是贯穿在从动物到产品这条线上的。这种研究已为产品的生产和市场,包括东方和西方,提供了新的知识和新的可能性。

The capacity of antlers for rapid growth and regeneration has fascinated eastern and western people for thousands of years. At the present time velvet (growing) antlers are valuable health products in the eastern and, increasingly, western nations. Farms in Asia, Australasia and North American satisfy the demands for the product, although production systems differ between countries and species farmed. We think of the velvet antler industry as a line from the deer, to the velvet antler, to the processed dried product to the product which is sold. Our research at Invermay has been carried out at all stages of this line and each component has been carefully integrated; this capability is unique internationally.

Research on antler growth has taken place in two main areas, development of the pedicle and first antler, and the growth process in the velvet antler. We have shown that reproductive steroids are essential for control of the antler cycle and growth factors control actual antler growth. Testosterone and growth factors are essential for pedicle initiation, but transformation to the first antler is testosterone independant.

In cell culture insulin like growth factors are potent stimulators of antler cell growth. Many of the factors which control antler growth are not secreted in the blood stream but act either in the cell itself or in adjacent cells. Expression of a large number of growth factors has been measured by molecular techniques in the antler tip. The antler growth pattern may resemble that of embryonic limb formation.

The composition of the antler has been studied at different stages of maturity from 30 to 100 days of growth. This has revealed important variations in rate of accretion of major chemical components. For example, the regression between ash content and stage of growth varies substantially for differing parts of the antler. The distribution of specific proteins and lipids in the antler, and the effects of stage of maturity, have been studied. Cell culture studies have revealed that extracts of antlers from different stages of maturity have differing potency in their ability to destroy cancer cells. This points to possible antler product differentiation based on knowledge of variations in medicinal activity.

Antler research at Invermay takes place at a number of places along a line between the animal and the product. This research has provided new knowledge and new possibilities for products—for Western as well as Eastern markets.