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## Parents For Safe Technology

(http://www.parentsforsafetechnology.org/electromagnetic-fields-and-cows.html)

Research on cows shows that these large mammals are significantly effected by EMF radiation. We think this should be a wake up call to humans who are mammals too!

## Electromagnetic Fields, Wireless and Cows

<u>Cows: A big model for EMF research, somewhere between Vet-Journals and</u> "Nature"

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- Effects of electromagnetic fields (EMF) on cows have been frequently discussed in public media as well as in specialist journals and meetings with agricultural, veterinary or dairy backgrounds. Indeed, in view of the available literature, it does seem that cows show EMF susceptibilities and respond to environmental exposures of a broad range of frequencies and properties:
- Cows are sensitive to the Earth's magnetic field. Bovine magnetoreception can be influenced by external EMF, e.g. powerlines.
- Several physiological alterations in dairy cows exposed to extremely low frequency (ELF) EMF were reported without major indications for adverse health effects. Notably, the observed effects seem to be dependent on the magnetic field component or on combined electric and magnetic fields rather than on electric field exposure alone.
- Cows are sensitive to earth currents (stray voltage) associated with transients in particular harmonics. Milk production, health, and behavior seem to be negatively affected.
- Bovine responses to radiofrequency (RF) exposure include avoidance behavior, reduced ruminating time, and alterations in oxidative stress. These findings indicate possible adverse health effects. However, most of the studies have critical points (one-herd-case report, logistic problems in study design, lack of appropriate exposure assessment) that confirmation of the observed RF effects is clearly needed, though studies in such big animals are time-, place-, and money-consuming, and exposure assessment and dosimetry are challenging issues.
- Overall, cattle seem to be affected by environmental EMF exposure.
  Cows align to geomagnetic field lines and are influenced by ELF EMF

## Magneto-reception in cows and other mammals:

Begall S, Cerveny J, Neef J, Vojtech O, Burda H. Magnetic alignment in grazing and resting cattle and deer. PNAS, 2008, 105:13451-13455

Burda H, Begall S, Cerveny J, Neef J, Nemec P. Extremely low-frequency electromagnetic fields disrupt magnetic alignment of ruminants. PNAS, 2009, 106:5708-5713

Hert J, Jelinek L, Pekarek L, Pavlicek A. No alignment of cattle along geomagnetic field lines found. J Comp Physiol A, 2011, 197:677-682

Begall S, Burda H, Cerveny J, Gerter O, Neef-Weisse J, Nemec P. Further support for the alignment of cattle along field lines: reply to Hert et al. J Comp Physiol A, 2011, 197:1127-1133

Cressey D. Magnetic cows are visible from space. Nature News, 2008

 An analysis of more than 8,000 cows claims they have a statistically significant preference to align themselves in a north-south direction. The team behind this study has also found a similar preference in deer, and believes the animals must be sensing the Earth's magnetic field.

Cressey D. Return of the B-field bovines. Nature News Blog, 2009

Cressey D. The mystery of the magnetic cows. Nature News, 2011 http://www.nature.com/news/the-mystery-of-the-magnetic-cows-1.9350

Slaby P, Tomanova K, Vacha M. Cattle on pastures do align along the North-South axis, but the alignment depends on herd density. J Comp Physiol A, 2013, 199:695-701

Cerveny J, Begall S, Koubek P, Novakova P, Burda H. Directional preference max enhance hunting accuracy in foraging foxes. Biol Lett, 2011, 7:355-357

Hart V, Novakova P, Malkemper EP, Begall S, Hanzal V, Jezek M, Kusta T, Nemcova V, Adamkova J, Benediktkova K, Cerveny J, Burda H. Dogs are sensitive to small variations of the Earth´s magnetic field. Frontiers Zoology, 2013, 10:80

Eder SHK, Cadiou H, Muhamad A, McNaughton PA, Kirschvink JL, Winklhofer M. Magnetic characterization of isolated candidate vertebrate magnetoreceptor cells. PNAS, 2012, 109:12022-12027

Effects of ELF electric and magnetic fields in (dairy) cows:

Algers B, Hultgren J. Effects of long-term exposure to a 400 kV, 50 Hz transmission line on estrous and fertility in cows. Prev Vet Med, 1987, 5:21-36

Algers B, Hennichs K. The effect of exposure to 400 kV transmission lines on the fertility of cows. Prev Vet Med, 1985, 3:351-361

Angell RF, Schott MR, Raleigh RJ, Bracken TD. Effects of a high-voltage direct-current transmission line on beef cattle production. Bioelectromagnetics, 1990, 11:273-282

Broucek J, Uhrincat M, Sandor A, Arave CW, Mihina S, Waiblinger S, Hanus A, Kisac P. Effect of low magnetic field on calves during prenatal development. Tierärztl Umschau, 2002, 57:241-248 (German)

Broucek J, Sandor A, Arave CW, Mihina S, Waiblinger S, Uhrincat M, Hanus A, Tancin V, Kisac P. Effect of low magnetic field on dairy cows. Tierärztl Umschau, 2001, 56:364-369 (German)

Stelletta C, De Nardo P, Santin F, Basso G, Michielotto B, Piccione G, Morgante M. Effects of exposure to extremely low frequency electromagnetic fields on circadian rhythms and distribution of some leukocyte differentiation antigens in dairy cows. Biomed Environ Sci, 2007, 2:164-170

Burchard JF, Nguyen DH, Richard L, Block E. Biological effects of electric and magnetic fields on productivity of dairy cows. J Dairy Sci, 1996, 79:1549-1554

Burchard JF, Nguyen DH, Block E. Effects of electric and magnetic fields on nocturnal melatonin concentrations in dairy cows. J Dairy Sci, 1998, 81:722-727

Burchard JF, Nguyen DH, Richard L, Young SN, Heyes MP, Block E. Effects of electromagnetic fields on the levels of biogenic amine metabolites, quinolinic acid, and beta-endorphin in the cerebrospinal fluid of dairy cows. Neurochem Res, 1998, 23:1527-1531

Burchard JF, Nguyen DH, Block E. Progesterone concentrations during

estrous cycle of dairy cows exposed to electric and magnetic fields. Bioelectromagnetics, 1998, 19:438-443

Burchard JF, Nguyen DH, Block E. Macro- and trace element concentrations in blood plasma and cerebrospinal fluid of dairy cows exposed to electric and magnetic fields. Bioelectromagnetics, 1999, 20:358-364

Rodriguez M, Petitclerc D, Nguyen DH, Block E, Burchard JF. Effect of electric and magnetic fields (60 Hz) on production, and levels of growth hormone and insulin-like growth factor 1, in lactating, pregnant cows subjected to short days. J Dairy Sci, 2002, 85:2843-2849

Burchard JF, Monardes H, Nguyen DH. Effects of 10 kV, 30  $\mu$ T, 60 Hz electric and magnetic fields on milk production and feed intake in nonpregnant dairy cattle. Bioelectromagnetics, 2003, 24:557-563

Rodriguez M, Petitclerc D, Burchard JF, Nguyen DH, Block E, Downey BR. Responses of the estrous cycle in dairy cows exposed to electric and magnetic fields (60 Hz) during 8-h photoperiods. Anim Reprod Sci, 2003, 77:11-20

Rodriguez M, Petitclerc D, Burchard JF, Nguyen DH, Block E. Blood melatonin and prolactin concentrations in dairy cows exposed to 60 Hz electric and magnetic fields during 8 h photoperiods. Bioelectromagnetics, 2004, 25:508-515

Burchard JF, Nguyen DH, Monardes HG, Petitclerc D. Lack of effect of 10 kV/m 60 Hz electric field exposure on pregnant heifer hormones. Bioelectromagnetics, 2004, 25:308-312

Nguyen DH, Richard L, Burchard JF. Exposure chamber for determining the biological effects of electric and magnetic fields on dairy cows. Bioelectromagnetics, 2005, 26:138-144

Burchard JF, Nguyen DH, Rodriguez M. Plasma concentrations of thyroxine in dairy cows exposed to 60 Hz electric and magnetic fields. Bioelectromagnetics, 2006, 27-553-559

Burchard JF, Nguyen DH, Monardes HG. Exposure of pregnant dairy heifer to magnetic fields at 60 Hz and 30  $\mu$ T. Bioelectromagnetics, 2007, 28:471-476

Effects of stray voltage in cows

Erdreich LS, Alexander DD, Wagner ME, Reinemann D. Meta-analysis of

stray voltage on dairy cattle. J Dairy Sci, 2009, 92:5951-5963

Hillman D, Stetzer D, Graham M, Goeke CL, Mathson KE, VanHorn HH, Wilcox CJ. Relationship of electric power quality to milk production of dairy herds – Field study with literature review. Sci Total Environ, 2013, 447:500-514

Effects of radiofrequency fields in cows:

Stärk KD, Krebs T, Altpeter E, Manz B, Griot C, Abelin T. Absence of chronic effect of exposure to short-wave radio broadcast signal on salivary melatonin concentrations in dairy cattle. J Pineal Res, 1997, 22:171-176

Löscher W, Käs G. Behavioral abnormalities in a dairy cow herd near a TV and radio transmitting antenna. Prakt Tierarzt, 1998, 79:437-444 (German)

Löscher W. Survey of effects of radiofrequency electromagnetic fields on production, health and behavior of farm animals. Prakt Tierarzt, 2003, 84:11 (German)

Wenzel C, Wöhr AC, Unshelm J. The effect of electromagnetic transmitters on behaviour of dairy cows. Prakt Tierarzt, 2002, 83:260-26 (German)

Hässig M, Jud F, Naegeli H, Kupper J, Spiess BM. Prevalence of nuclear cataract in Swiss veal calves and its possible association with mobile telephone antenna base stations. Schweiz Arch Tierheilkd, 2009, 151:471-478

Hässig M, Wullschleger M, Naegeli HP, Kupper J, Spiess B, Kuster N, Capstick M, Murbach M. Influence of non ionizing radiation of base stations on the activity of redox proteins in bovines. BMC Vet Res, 2014, 10:136

Bavarian Study on cows, 2001 (German):

Investigations on the impact of exposure to electromagnetics fields from mobile phone base stations on health, production, and behavior of cattle

Untersuchungen zum Einfluss elektromagnetischer Felder von Mobilfunkanlagen auf Gesundheit, Leistung und Verhalten von Rindern

Bayerisches Staatsministerium für Landesentwicklung und Umweltfragen (eds): Umwelt und Entwicklung. Materialien 158. StMLU, München 2001

Volmer K, Hecht W, Herzog A. Teil 1 – Klinisch-genetische, -hämatologische,

-chemische und epidemiologische Untersuchungen

Wenzel C, Wöhr AC, Klempt M, Unshelm J. Teil 2 – Verhalten und Labortests

Wuschek M. Teil 3 - Feldexposition